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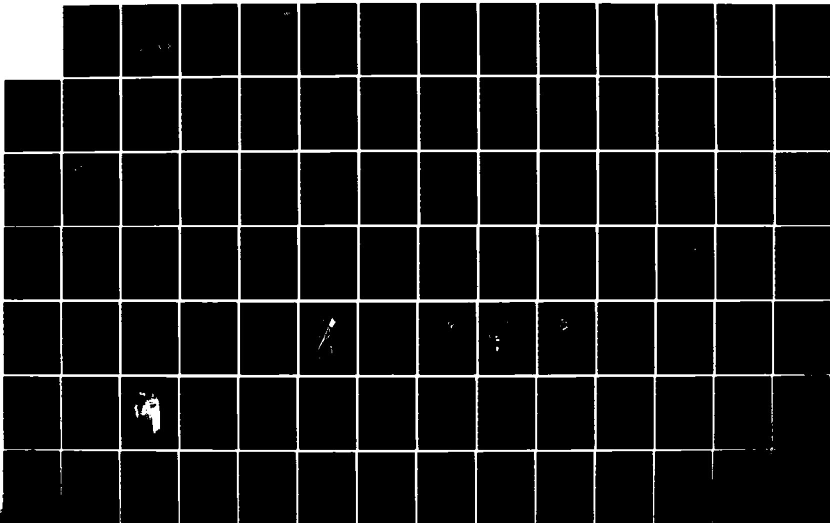

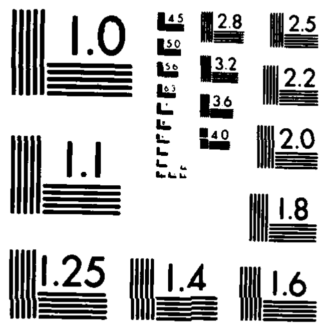

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M-X/MPS

ENVIRONMENTAL

TECHNICAL REPORT

PRELIMINARY FEIS

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DEPARTMENT OF THE AIR FORCE

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M-X/~~MPS~~ ETR-31

CONSTRUCTION

Prepared for

United States Air Force
Ballistic Missile Office
Norton Air Force Base, California

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2 October 1981

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

Federal, State and Local Agencies

On October 2, 1981, the President announced his decision to complete production of the M-X missile, but cancelled the M-X Multiple Protective Shelter (MPS) basing system. The Air Force was, at the time of these decisions, working to prepare a Final Environmental Impact Statement (FEIS) for the MPS site selection process. These efforts have been terminated and the Air Force no longer intends to file a FEIS for the MPS system. However, the attached preliminary FEIS captures the environmental data and analysis in the document that was nearing completion when the President decided to deploy the system in a different manner.

The preliminary FEIS and associated technical reports represent an intensive effort at resource planning and development that may be of significant value to state and local agencies involved in future planning efforts in the study area. Therefore, in response to requests for environmental technical data from the Congress, federal agencies and the states involved, we have published limited copies of the document for their use. Other interested parties may obtain copies by contacting:

National Technical Information Service
United States Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161
Telephone: (703) 487-4650

Sincerely,

JAMES F. BOATRIGHT
Deputy Assistant Secretary
of the Air Force (Installations)

1 Attachment
Preliminary FEIS

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1.0 OVERVIEW

1.1 INTRODUCTION

M-X deployment and related construction planning are in preliminary stages, with many detailed decisions yet to be made, as outlined by the tiered decision-making process described in subsection 1.10.2 of the FEIS. However, certain actions must be taken on an advanced schedule to meet the objective stated by Congress as ". . . the development of the M-X missile, together with a new basing mode for such missile, should proceed as to achieve Limited Operational Capability (LOC) for both such missile and such basing mode at the earliest practical date." One of these actions is an advanced schedule selection of a deployment area or areas.

Construction of the protective shelters, roads, and base complexes creates significant direct environmental effects which must be analyzed to determine the potential impacts to the natural environment, and on the social and economic fabric of the deployment areas.

Construction plans, covering personnel and material resource requirements, specific in amount, time, and place provided the information used in the environmental analysis reported in the DEIS. These estimates were based on information available at that time. Since then more detailed plans and new data have been developed. Using this information, new estimates have been prepared for the total number of workers required to construct the M-X deployment facility.

In November 1980, a Task Force of representatives of the Corps of Engineers, Air Force Engineers, and Air Force Contract Consultants was convened by the Air Force Regional Civil Engineer, M-X, at Norton AFB to seek agreement on this estimate for numbers and staging of construction workers. This group, Task Force II, reconvened in March, 1981, to finalize their work on the scheduling of the construction. Their report forms the basis for construction schedules and workers presented in this FEIS. It should be noted that all of the construction personnel estimates are based upon the assumption that each worker will work a standard 40-hour week. See Appendix G of this ETR for further details.

1.2 SUMMARY

The M-X system would directly affect the area in which it is constructed and cause many indirect impacts on the environment. To evaluate these indirect impacts, it is necessary to determine specifically what the construction effects are, and when, where, and to what extent they occur.

This report identifies the environmental effects caused directly by construction of the system. Indirect environmental impacts are described in the FEIS and detailed in other ETRs. Major effects due to construction are the requirements for land, water, materials, and personnel, as well as the location, timing, and magnitude of each of these resource requirements. The proposed and alternative systems are described in Section 2 of this ETR. Section 3 describes, in more detail, each of the individual components which must be constructed. The sequencing of construction of the various parts of the system is contained in Section 4. Section 5 describes the method of construction of each of the components. The impacts and their possible

mitigations are discussed in Section 6. The overall project effects, evaluated in terms of land and material resources required, are similar for each of the alternatives. Appendices A through E present a system layout, a construction plan and schedule, and a breakdown of the construction resources for the Proposed Action and each alternative. Appendix F presents a discussion of the latest design of the M-X system facilities as it relates to the Proposed Action, and compares this latest design to that used in this FEIS for analysis. Appendix G presents the background and documentation for the construction manpower estimates made by Task Force I and Task Force II.

The differences between the systems in Nevada/Utah and Texas/New Mexico are due primarily to differences in the lengths of roads required. The ruggedness of terrain in the Nevada/Utah region leads to a more dispersed system, and therefore, to longer roads than in Texas/New Mexico.

Although overall project effects are similar, this must not be interpreted to mean that the environmental impacts are also similar. The same project effects acting in different areas may cause far different impacts. The impacts are discussed in the FEIS.

Tables 1.2-1 through 1.2-3 list the land requirements for facilities, roads, and temporary construction facilities, respectively. Table 1.2-4 is a summary of the M-X system land requirements. A list of the construction resources requirements is given in Table 1.2-5. Additional information on water, cement, and steel may be found in ETRs 12, 25, and 26, respectively.

The design of the M-X system has gone through an evolutionary process that began with a system of underground tunnels, and finally evolved to the current design. This design is not final, and will undoubtedly be refined further.

The system, as currently designed, will be composed of two operating base complexes, 200 clusters with 23 protective shelters each, and a system of interconnecting roads. The specific designs of each of the project components are not yet completed. Numerous studies are currently underway to develop the optimum design for each component, as well as the schedule for construction. Among the more important studies currently underway are those that will establish the method of construction of the protective shelters, the design of the roads and shelter, and the construction plan for the designated deployment area facilities. Moreover, the precise locations for each component have not yet been identified.

This analysis is based on the preliminary designs and system layouts, considered valid at the time of analysis, and on a representative, conceptual schedule. These component designs may be refined, or modified to some extent, before actual construction begins. They are considered sufficiently accurate to make an environmental analysis for deployment area selection.

Table 1.2-1. Land requirements for facilities.

Facility	Number	Construction Phase (Acres)		Operations Phase (Acres)		
		Each	Total	Fenced Each	Nonfenced	Total
OB Complexes						
First Operating Base (OB)[1]	1	6,140	6,140	3,740	2,400	6,140
Second Operating Base (OB)[1]	1	4,240	4,240	2,740	1,500	4,240
Operational Base Test Site/Training Site (OBTS)[2]	1	250	250	30	60	90
Designated Assembly Area (DAA)[3]	1	1,950	1,950	1,950	-	1,950
DDA						
Shelters	4,600	10.0	46,000	2.5	-	11,500
Cluster Maintenance Facilities (CMFs)	200	5.2	1,040	4.0	-	800
Antennae	4,600	0.185	850	-	850	850
Area Support Centers (ASCs)	3-5	55	165-275	20	35	165-275
Remote Surveillance Sites (RSSs)[5]	200	0.35	70	0.25	-	50
Total			59,855-59,965			24,935-25,045[4,6]

T5904/10-2-81/F

[1]Includes runway and clear zones.

[2]Located near first operating base.

[3]Co-located at first operating base (OB); for split deployment there would be 2 DAAs (1 at each base).

[4]For Proposed Action total fenced land is 20,890 acres; total nonfenced land is 4,100.

[5]There is a study presently underway that could revise the need for RSSs, thereby reducing the land requirements. Alternatives to the RSSs would be placed in areas already required for operations.

[6]Total does not include area required for power substations, which require an additional 40 acres.

Source: Department of the Air Force and HDR Sciences, 1981.

Table 1.2-2. Land requirements for roads.[5]

Description	Length (Miles)	Area Required During Construction[4] (Acres)	Permanently Required Right-of-Way (Acres)
Designated Transportation Network (DTN)[1]	1,260-1,460	15,300-17,700	11,500-13,300
Cluster Roads[2]	5,940-6,200	72,000-75,200	54,000-56,400
Support Roads[3]	1,320	8,000	8,000
Total	8,520-8,980	95,300-100,900	73,500-77,700

T5903/10-2-81/F(a)

[1] DTN is 24 ft wide with 5 ft shoulders, 100 ft construction right-of-way, 75 ft permanent right-of-way.

[2] Cluster roads are 21 or 27 ft wide with 5 ft shoulders, 100 ft construction right-of-way, 75 ft permanent right-of-way.

[3] Support roads are 10 or 20 ft wide with 5 ft shoulders, 50 ft construction and permanent rights-of-way.

[4] Same as disturbed area.

[5] This provides a range for all deployment alternatives. If the direct-connect roads concept is used, the land requirements would be less than shown.

Source: Department of the Air Force and HDR Sciences calculation.

Table 1.2-3. Land requirements for temporary construction facilities.[1,4]

Description	Number or Length in Miles	Unit Area	Total Area (Acres)
Construction Camps	16-20	25 acres/each	400-500
Precast Concrete Plants	16-20	10 acres/each	160-200
Material Source Points[2]	100-125	10 acres/each	1,000-1,250
Water Wells	150-310	1 acre/each	150-310
Marshalling Yards	3-5	650 acres/each	1,950-3,250
Construction Roads[3]	250-350	3.6 acres/mile	900-1,300
Total			4,560-6,810

T2599/9-13-81/F

[1]This provides a range for all deployment alternatives.

[2]Includes plants and quarries.

[3]Roads to material sources, 30 ft roadway, including shoulders.

[4]See Appendix F of ETR-31 for information on latest design.

Source: HDR Sciences, 1981.

Table 1.2-4. Summary of M-X system land requirements[3]

Description	Number or Length in Miles	Construction Phase (Acres)	Operations Phase (Acres)	
			Fenced[1]	Total
Permanent Facilities				
OB Complexes				
First OB	1	6,140	3,740	6,140
Second OB	1	4,240-6,140[2]	2,740-3,740[2]	4,240-6,140[2]
OBTS	1	250	30	90
DAA	1-2[2]	1,950-3,900[2]	1,950-3,900[2]	1,950-3,900[2]
Subtotal		12,580-16,430[2]	8,460-11,410[2]	12,420-16,270[2]
DDA				
Shelters	4,600	46,000	11,500	11,500
CMFs	200	1,040	800	800
Antennae	4,600	850	N/A	850
ASCs	3-5	165-275	60-100	165-275
RSSs	200	70	50	50
DTN	1,260-1,460	15,300-17,700	N/A	11,500-13,300
Cluster Roads	5,940-6,200	72,000-75,200	N/A	54,000-56,400
Support Roads	1,320	8,000	N/A	8,000
Subtotal		143,425-149,135	12,410-12,450	86,865-91,175
Total Permanent Facilities		156,005-165,565	20,870-23,860	99,285-107,445
Temporary Facilities[4]				
Construction Camps	16-20	400-500	N/A	N/A
Precast Concrete Plants	16-20	160-200	N/A	N/A
Material Source Points	100-125	1,000-1,250	N/A	N/A
Water Wells	150-310	150-310	N/A	N/A
Marshalling Yards	3-5	1,950-3,250	N/A	N/A
Construction Roads	250-350	900-1,300	N/A	N/A
Total Temporary Facilities		4,560-6,810		
Grand Total		160,565-172,375	20,870-23,860	99,285-107,445

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Notes: Not applicable = N/A
There is a study presently underway that could revise the need for RSSs, thereby reducing the land requirements. Alternatives to the RSSs would be placed in areas already required for operations.

[1] 20,870 acres = 32.6 sq mi (Proposed Action and Alternatives 1 through 7).

[2] High end of range reflects split deployment (Alternative 8).

[3] This provides a range for all deployment alternatives.

[4] See Appendix F of ETR-31 for information on latest design.

Source: Department of the Air Force and HDR Sciences, 1981.

Table 1.2-5. Construction resources by alternative.[1]

Construction Resource	Alternative P.A., 1-6	Alternative 7	Alternative 8
Disturbed Area[3] (x 10^3 acres)	160-177	153-169	161-178
Water (x 10^3 acre-ft)	86-186[2]	56-175[2]	71-184[2]
Aggregate[3] (x 10^3 cu yd)	49,031-59,927	46,242-56,518	47,900-58,544
Steel[3] (x 10^3 tons)	376-416	376-416	377-417
Cement[3] (x 10^3 tons)	1,446-1,598	1,446-1,598	1,459-1,613
Fly Ash[3] (x 10^3 tons)	307-339	307-339	324-358
Lumber[3] (x 10^3 board-ft)	40,733-45,021	40,300-44,542	51,264-56,660
Asphaltic Oil[3] (x 10^3 tons)	461-564	409-500	441-539
POL[4] (x 10^6 gal)	459-561	334-408	354-432
Electrical Energy (x 10^3 MWh)	3,226-3,942	2,322-2,838	3,171-3,875

T3173/10-2-81/F

[1]Ranges of resources allow for possible design changes and/or construction overruns.

[2]Low number is with no revegetation; high number is with revegetation requiring 9 in. of water on 100,000 acres.

[3]Does not include temporary facilities.

[4]POL=petroleum, oil, and lubricant.

Source: HDR Sciences, 1981.

2.0 M-X SYSTEM DESCRIPTION AND ALTERNATIVES

2.1 INTRODUCTION

The M-X system consists of two operating base (OB) complexes and a designated deployment area (DDA). The makeup of the OB complexes and the DDA are generally dependent upon the deployment option selected. There are two deployment options for the M-X system: full deployment and split deployment.

Full deployment is the placement of the entire 200 missiles in 200 linear clusters (each cluster contains 23 protective shelters, out of a total of 4,600 shelters) in a two-state region. There are two such regions being considered: Nevada/Utah and Texas/New Mexico. Split deployment is identical to full deployment in that the total number of missiles, clusters, and shelters are the same. However, the deployment is in both of the two-state regions, with one-half of the missiles in each region.

The OB complexes are classified as either a first or a second OB complex. The first OB complex always has an operating base (OB), a designated assembly area (DAA), an operational base test site (OBTS), and an airfield. The first OB complex is connected to the DDA by the designated transportation network (DTN). The second OB complex has an OB and an airfield for the full deployment option, and it is not connected to the DDA. For split deployment the second OB complex has an OB, DAA, and airfield. It is connected to the DDA by the DTN.

The main components of the DDA are the protective shelters, DTN, cluster roads, cluster maintenance facilities (CMFs), and remote surveillance sites (RSSs). Also located in the DDA are area support centers (ASCs), the total number of which is dependent upon whether the full or split deployment option is selected. In some of the system alternatives, an ASC may be colocated within an OB complex.

There are nine system alternatives under consideration. Table 2.1-1 shows the OB complex locations and components for these alternatives. The distribution of protection shelters by state and by county for the alternatives is given in Table 2.1-2.

A schedule for construction in the DDA has been developed for each of the alternatives by Task Force II in March, 1981. These schedules were provided by the Department of the Air Force, Headquarters Ballistic Missile Office (AFSC) on April 28, 1981, for inclusion in this FEIS.

2.2 PROPOSED ACTION

The Proposed Action is full deployment in the Nevada/Utah region. The 23 protective shelters in each cluster are arranged in a two-thirds filled hexagonal pattern and spaced a nominal 5,200 ft apart. Figure 2.2-1 schematically shows the hexagonal shelter pattern. The first OB complex is located near Coyote Spring Valley, Nevada. The second OB complex is near Milford, Utah. Figure 2.2-2 shows the system layout for the Proposed Action.

The system ranges east-west from Tonopah, Nevada, to Delta, Utah; and north-south from approximately Eureka to Caliente, Nevada. Other communites in

Table 2.1-1. OB complex locations and components for Proposed Action and alternatives.

Alternative	First OB Complex		Second OB Complex	
	Location	System Components	Location	System Components
Proposed Action	Coyote Spring Valley, Nevada	OB, DAA, OBTS, Airfield	Milford, Utah	OB, Airfield
1	Coyote Spring Valley, Nevada	OB, DAA, OBTS, Airfield	Beryl, Utah	OB, Airfield
2	Coyote Spring Valley, Nevada	OB, DAA, OBTS, Airfield	Delta, Utah	OB, Airfield
3	Beryl, Utah	OB, DAA, OBTS, Airfield	Ely, Nevada	OB, Airfield
4	Beryl, Utah	OB, DAA, OBTS, Airfield	Coyote Spring Valley, Nevada	OB, Airfield
5	Milford, Utah	OB, DAA, OBTS, Airfield	Ely, Nevada	OB, Airfield
6	Milford, Utah	OB, DAA, OBTS, Airfield	Coyote Spring Valley, Nevada	OB, Airfield
7	Clovis, New Mexico	OB, DAA, OBTS, Airfield	Dalhart, Texas	OB, Airfield
8	Coyote Spring Valley, Nevada	OB, DAA, OBTS, Airfield	Clovis, New Mexico	OB, DAA, Airfield
No Action	-	-	-	-

T3601/10-2-81/F(a)

Source: Department of the Air Force and HDR Sciences calculation.

Table 2.1-2. Number of protective shelters in each state and county for Proposed Action (PA) and Alternatives.

State/County	Alternative PA, 1-6	7	8
Nevada			
Esmeralda	138	--	--
Eureka	323	--	--
Lander	84	--	--
Lincoln	953	--	920
Nye	1,324	--	629
White Pine	437	--	36
Subtotal	3,259	--	1,585
Utah			
Beaver	189	--	188
Juab	314	--	17
Millard	754	--	510
Tooele	84	--	--
Subtotal	1,341	--	715
Region Total	4,600	--	2,300
Texas			
Bailey	--	126	14
Castro	--	137	--
Cochran	--	61	51
Dallam	--	690	190
Deaf Smith	--	574	242
Hartley	--	354	250
Hockley	--	16	14
Lamb	--	42	9
Oldham	--	74	41
Parmer	--	246	1
Randall	--	55	--
Sherman	--	39	--
Swisher	--	26	--
Subtotal	--	2,440	812
New Mexico			
Chaves	--	481	474
Curry	--	196	43
DeBaca	--	137	115
Guadalupe	--	6	6
Harding	--	215	202
Lea	--	16	16
Quay	--	342	312
Roosevelt	--	542	165
Union	--	225	155
Subtotal	--	2,160	1,488
Region Total	--	4,600	2,300
Total	4,600	4,600	4,600

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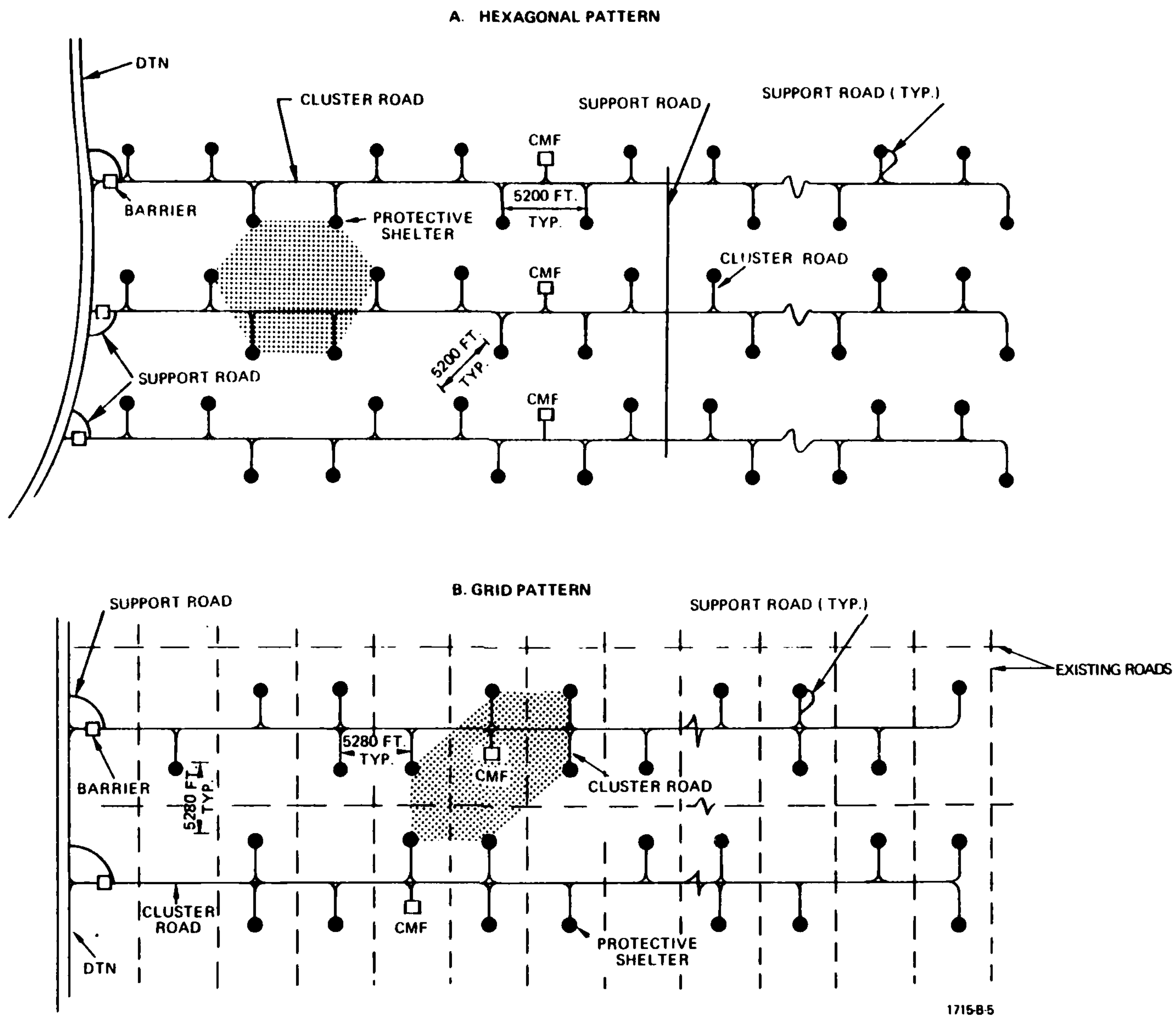
Source: HDR Sciences calculation.



Source: HDR Sciences, 1981.

Figure 2.2-1. Hexagonal and grid shelter patterns.

the general vicinity of the DDA include Austin, Ely, Pioche, and Panaca, Nevada; and Hinckley and Milford, Utah.

Major highways in the area include Federal Aid Primary Routes U.S.50, 6, and 93. State highways include 8A, 25, and 38 in Nevada; and 121 and 257 in Utah. Although not in the immediate area, Interstates 80 from Reno, Nevada to Salt Lake City, Utah; and 15 from Las Vegas, Nevada to Salt Lake City provide important means of access to the region.

Roughly paralleling the above routes are the Union Pacific Railroad's east-west mainline to San Francisco, California; and another line from Salt Lake City to Las Vegas and Los Angeles. Also, a spur line runs south from the east-west mainline to Ely.

For the Proposed Action, the DTN begins at the first OB complex near Coyote Spring Valley and proceeds north to Dry Lake Valley, where it splits to the east and west. The eastern branch continues through Nevada to Utah, where it terminates in Sevier Desert Valley, north of Delta. The western branch continues to Railroad Valley, where it splits again; one portion continuing west to Big Smoky Valley and the other going north to Newark Valley, both in Nevada. The northern portion separates in Newark Valley with one branch proceeding west and terminating in Monitor Valley, and the second branch going east and ending in Butte Valley. The total length of DTN is approximately 1,460 mi. About 6,200 mi of cluster roads are needed.

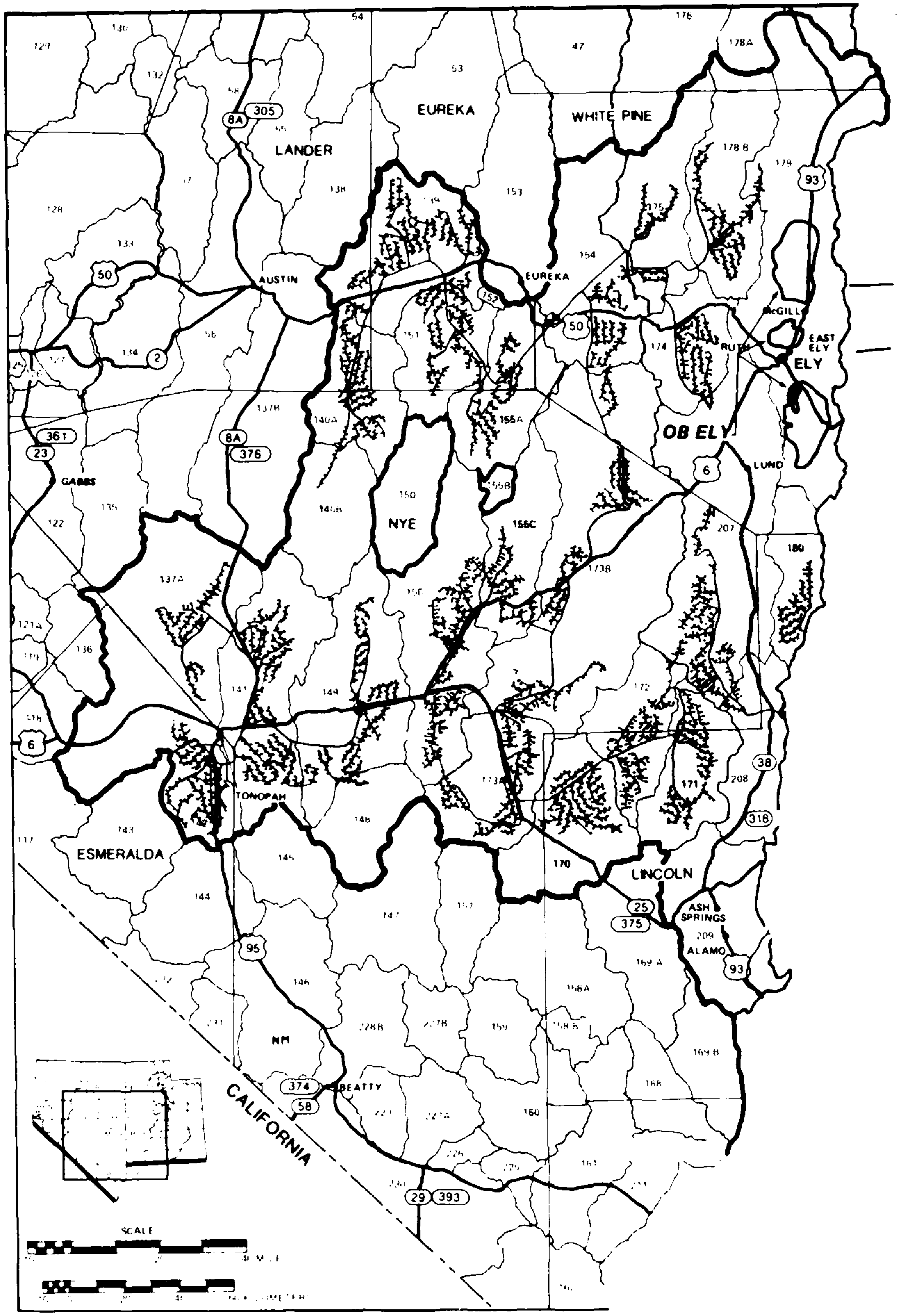
2.3 ALTERNATIVES 1 THROUGH 6

Alternatives 1 through 6 are similar to the Proposed Action in that they are all full deployment in the Nevada/Utah region and use the same DDA. They vary in that they have different locations and combinations for the first and second OB complexes. Figure 2.2-2 also shows the system layouts for Alternatives 1 through 6.

Alternatives 1 and 2 are the same as the Proposed Action in that they have the same location for the first OB complex, near Coyote Spring Valley, Nevada. However, they have different sites for the second OB complex. Alternative 1 has the second OB complex near Beryl, Utah; and Alternative 2, near Delta, Utah. Alternatives 3, 4, 5, and 6 have the first OB complex located in Utah with the second OB complex in Nevada. A site near Beryl is the location for the first OB complex for Alternatives 3 and 4, while Alternatives 5 and 6 use a location near Milford. Alternatives 3 and 5 employ the same second OB complex site, near Ely; and Alternatives 4 and 6 also use a common second OB complex location, near Coyote Spring Valley.

2.4 ALTERNATIVE 7

Alternative 7 is similar to the Proposed Action and Alternatives 1 through 6 in that it is full deployment in a single two-state region. The 23 protective shelters in each cluster are arranged in a two-thirds filled hexagonal pattern spaced a nominal 5,200 ft apart, or in a two-thirds filled grid pattern spaced a nominal 5,280 ft apart (see Figure 2.2-1). The two-state region used for deployment for Alternative 7 is Texas/New Mexico. The first OB complex is located near Clovis, New Mexico; the second OB complex near Dalhart, Texas. Figure 2.4-1 shows the system layout for Alternative 7.



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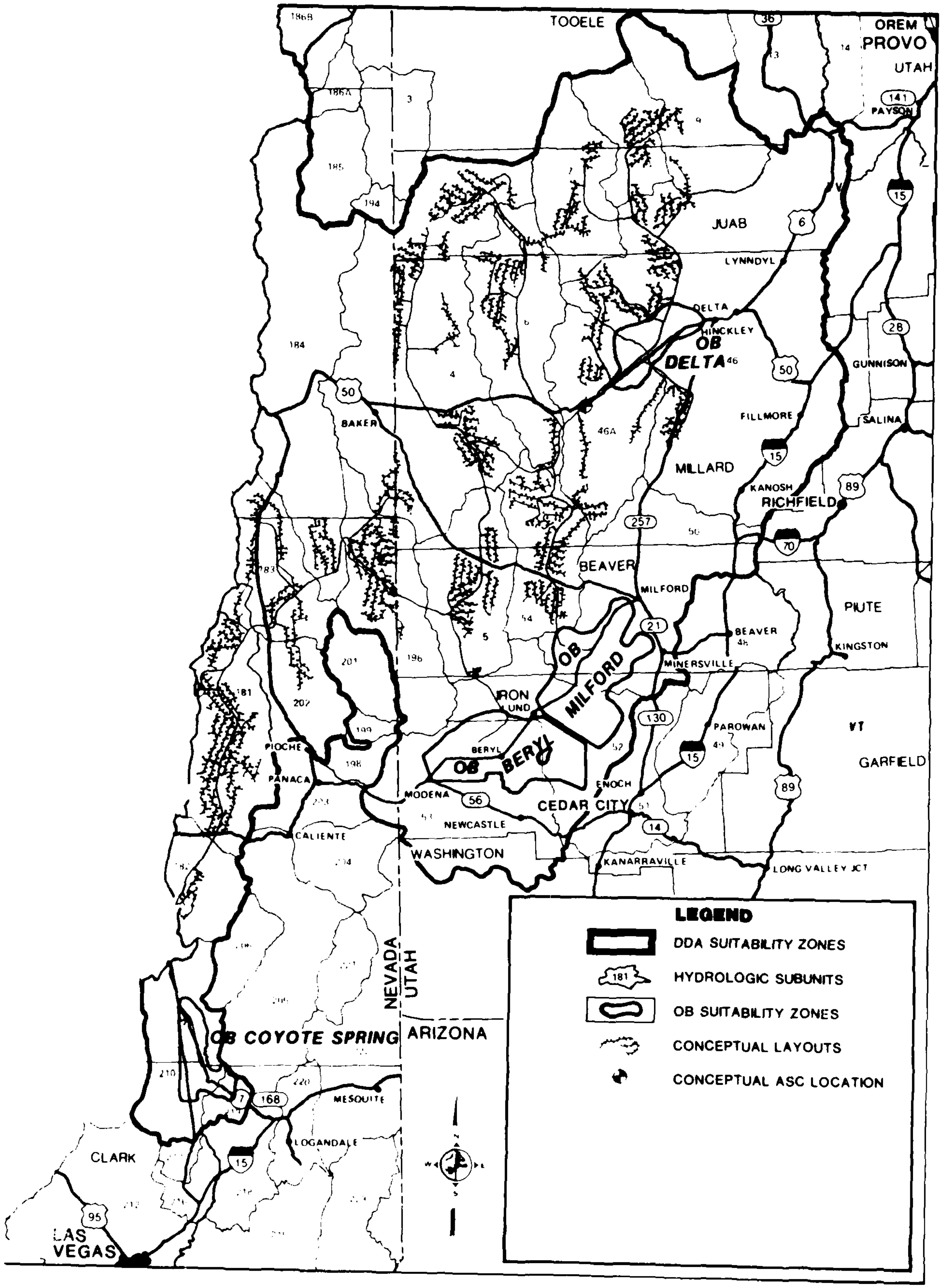

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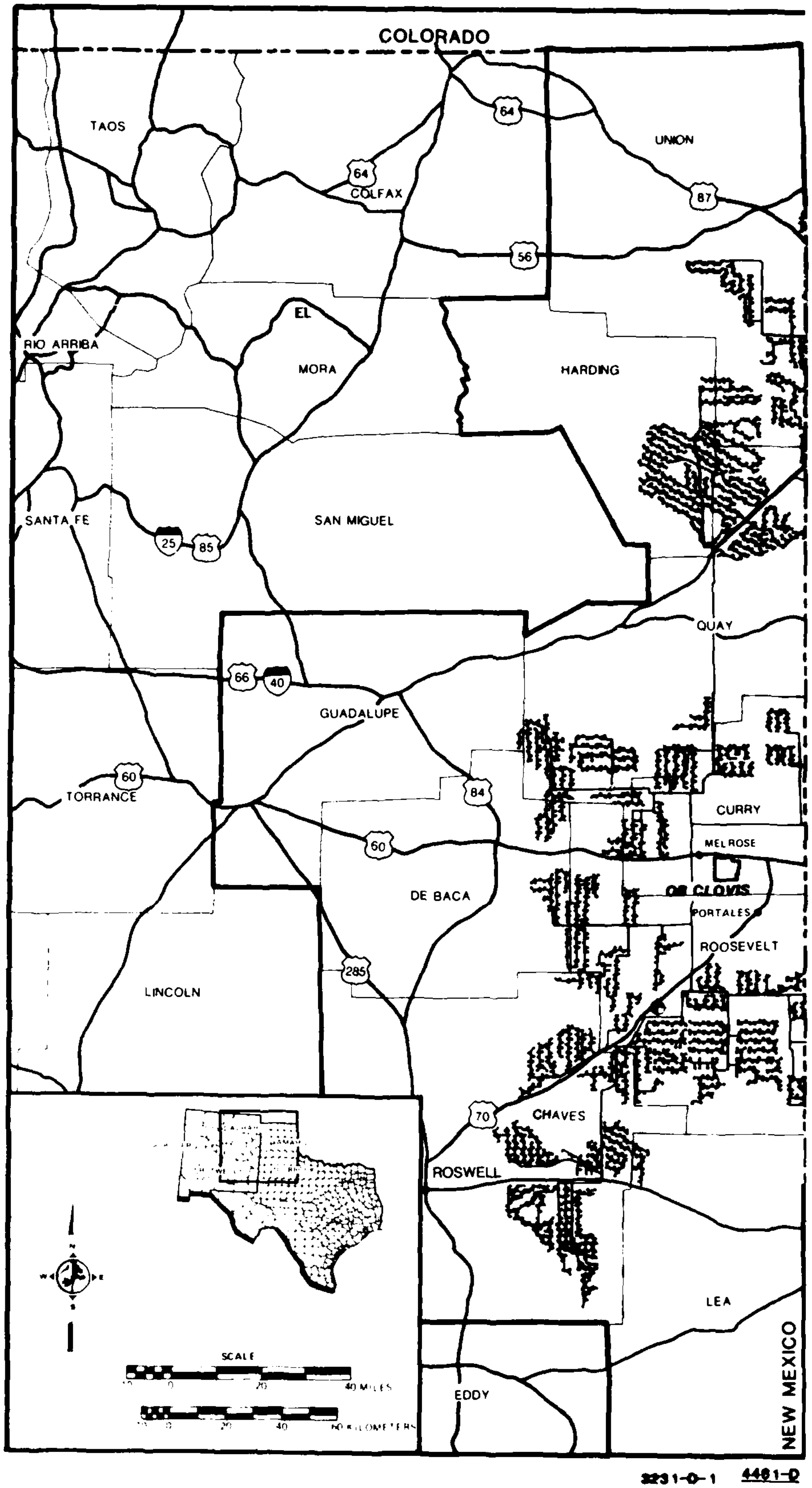
Figure 2.2-2. System layout for the Proposed Action, full deployment, Nevada/Utah.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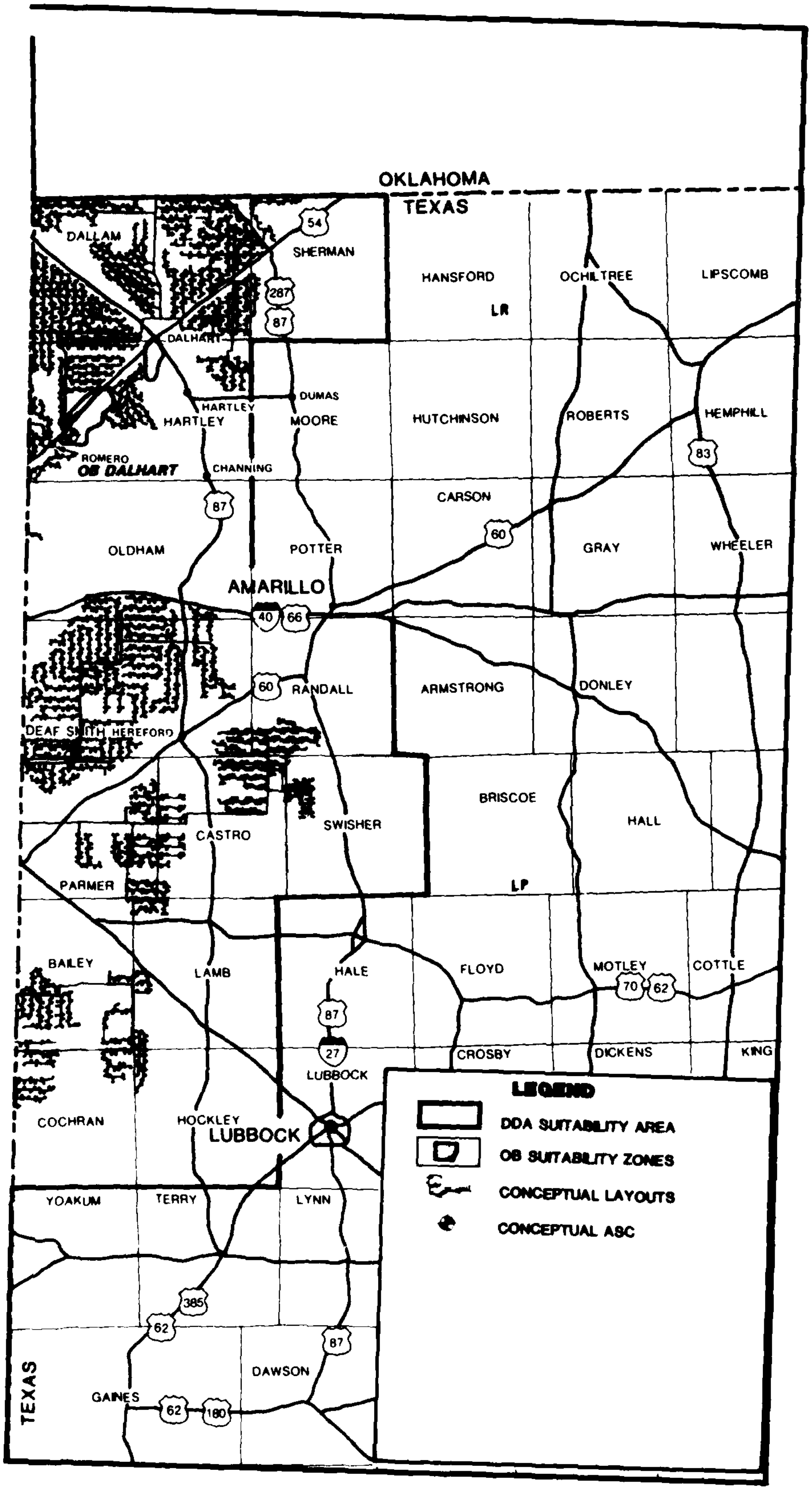


Figure 2.4-1. System layout for Alternative 7, full deployment, Texas/New Mexico.

In Texas/New Mexico, the full deployment area is bounded by Roswell, New Mexico on the southwest and Dalhart, Texas on the northeast. Other major cities in the area include Amarillo and Lubbock, Texas. Counties in Texas where the system is proposed include Dallam, Sherman, Hartley, Randall, Oldham, Deaf Smith, Parmer, Castro, Swisher, Bailey, Lamb, Cochran, and Hockley. New Mexico counties include Union, Harding, Quay, De Baca, Roosevelt, Curry, Chaves, Guadalupe, and Lea.

Interstate 40, between Albuquerque, New Mexico and Amarillo, Texas, bisects the area. Major Federal Aid Primary Routes include U.S.54, 60, 70, 84, 380, and 385.

The DTN branches from the first OB complex to the DDA in two directions. A northerly branch parallels much of the existing road system and separates frequently to access clusters in Texas and New Mexico. The southerly extension picks up clusters in New Mexico and then turns east to provide access to the remaining clusters in Texas.

The DTN is approximately 1,260 mi long. About 5,940 mi of cluster roads are required. Much of the Texas/New Mexico siting region contains section roads at one mile intervals. Where available they are used as cluster roads to minimize road construction and environmental impact. Approximately 1,300 mi of cluster roads will coexist with the present road system. The total road network for Alternative 7 is approximately six percent less than that for the Proposed Action.

2.5 ALTERNATIVE 8

Alternative 8 is split deployment in the Nevada/Utah and Texas/New Mexico regions. The 23 protective shelters in each of the 200 clusters are arranged in a two-thirds filled hexagonal pattern spaced a nominal 5,200 ft apart (Nevada/Utah and Texas/New Mexico), or in a two-thirds filled grid pattern spaced a nominal 5,280 ft apart (Texas/New Mexico). One hundred clusters are located in the Nevada/Utah region with the first OB complex near Coyote Spring Valley, Nevada. The remaining 100 clusters are in the Texas/New Mexico region, with the second OB complex near Clovis, New Mexico. The system layout for Alternative 8 is shown in Figure 2.5-1 (Nevada/Utah) and Figure 2.5-2 (Texas/New Mexico).

The Nevada/Utah portion of the system extends from Moapa, Nevada on the south to Delta, Utah on the north. Other major communities in the area include Caliente, Pioche, and Panaca, Nevada; and Beryl, Milford, Delta, and Hinckley, Utah. White Pine, Nye, and Lincoln counties in Nevada; and Juab, Millard, and Beaver counties in Utah are affected by this alternative.

The Texas/New Mexico portion extends from southern Chaves County, New Mexico to northern Dallam County, Texas. Other affected counties include Guadalupe, Harding, Lea, Roosevelt, Union, Quay, De Baca, and Curry counties in New Mexico; and Parmer, Bailey, Lamb, Deaf Smith, Hartley, Oldham, Cochran, and Hockley in Texas. Principal cities in the area include Clovis, New Mexico and Dalhart, Texas. Amarillo and Lubbock, Texas lie outside the area, just east of the DDA.

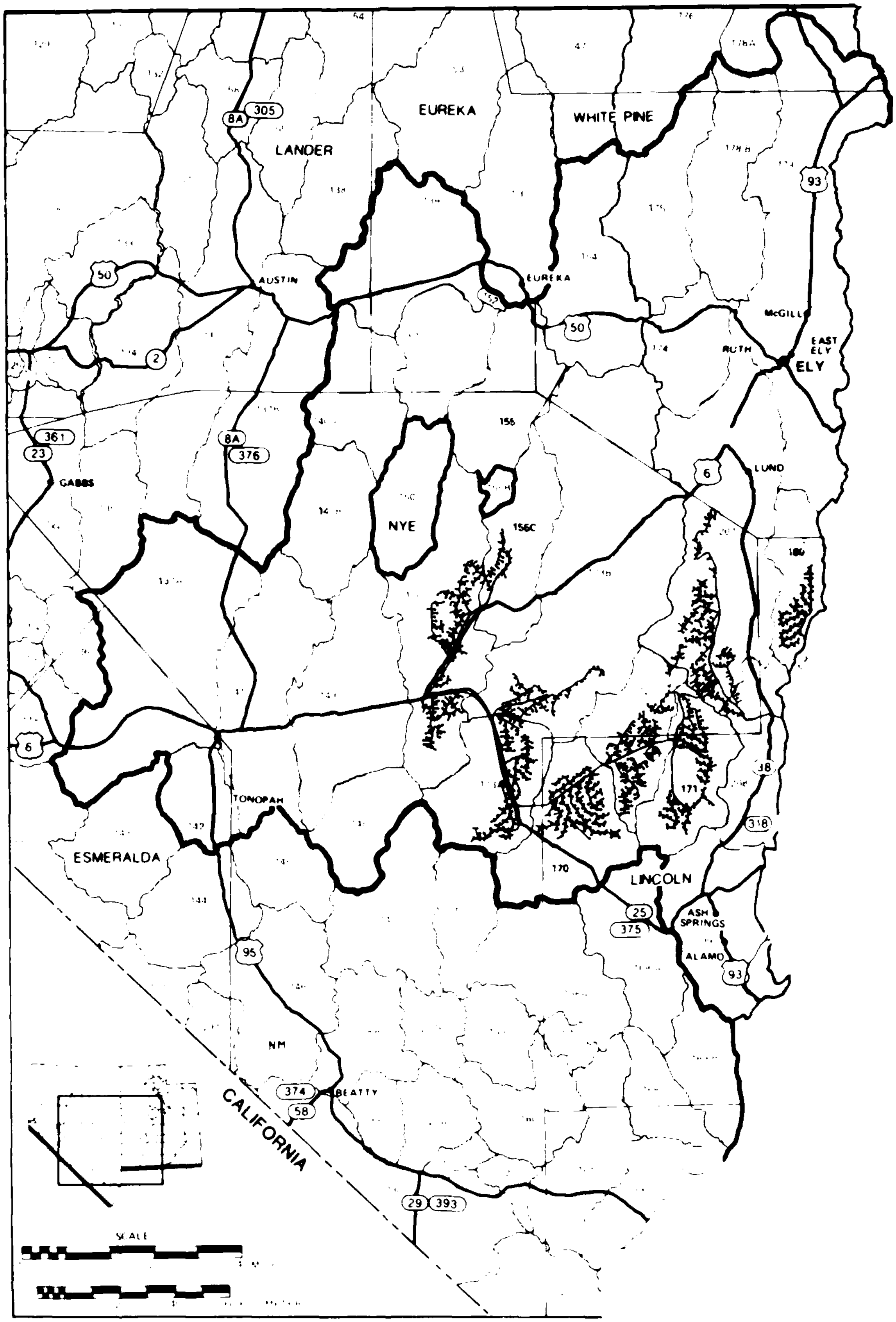
Major Federal Aid Primary highways include U.S. Routes 6, 50, and 93 in the Nevada/Utah region; and 54, 87, 380, 60, 70, 84, and 385 in the Texas/New Mexico

region. Combined Interstate 40 - U.S. Route 66 bisects the DDA in Texas/New Mexico.

In the Nevada/Utah portion of the system, the DTN originates near Coyote Spring Valley, Nevada and proceeds north to Dry Lake Valley, where it branches to the east and west to access the remaining clusters. Essentially, this system duplicates a portion of the deployment area shown for the Proposed Action with approximately 70 clusters in Nevada and 30 in Utah. Approximately 730 mi of DTN and 3,100 mi of cluster roads will be needed.

Similarly, in Texas/New Mexico, the DTN follows the same alignment used in the Texas/New Mexico full deployment system (Alternative 7). The DDA for Alternative 8 is a portion of the DDA for Alternative 7, with approximately 35 clusters located in Texas and 65 in New Mexico. About 650 mi of DTN and 2,970 mi of cluster roads are required.

A total of 1,380 mi is estimated for the DTN. Cluster road construction will total about 6,070 mi.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8A
376
GABBS
6
LUND
NYE
156C
180
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TONOPAH
ESMERALDA
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LINCOLN
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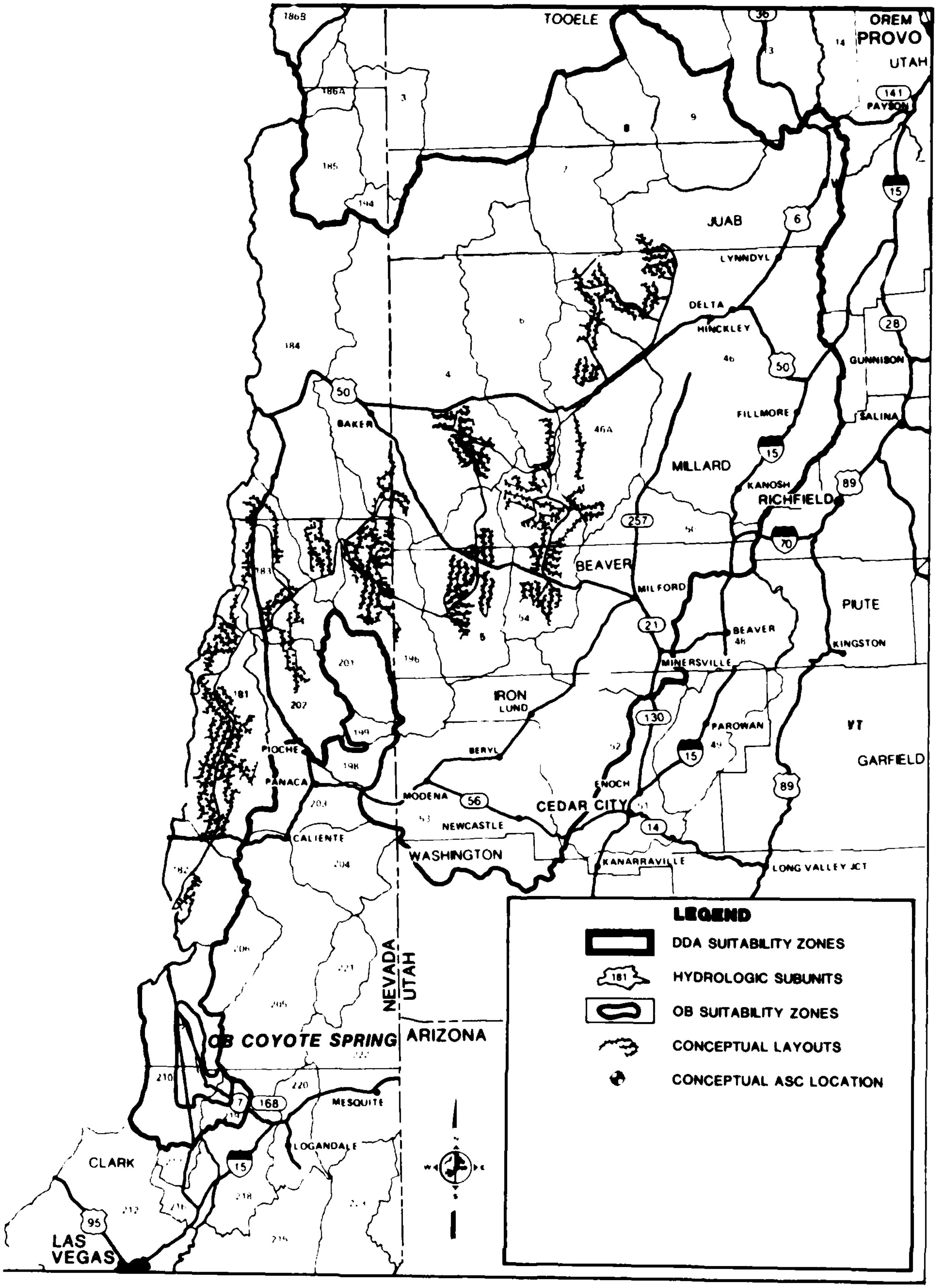

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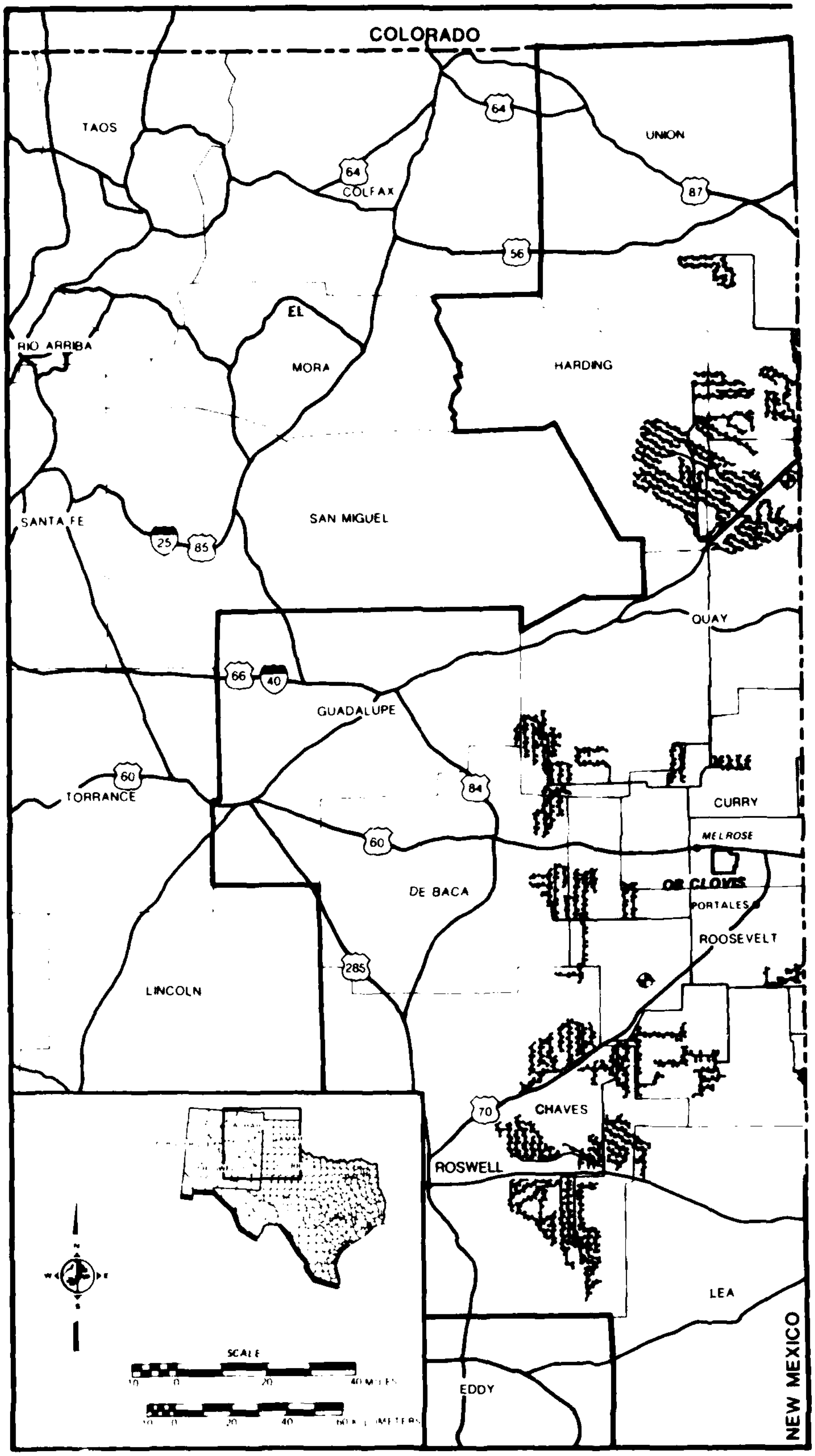
Figure 2.5-1. System layout for portion of Alternative 8, split deployment, Nevada/Utah.



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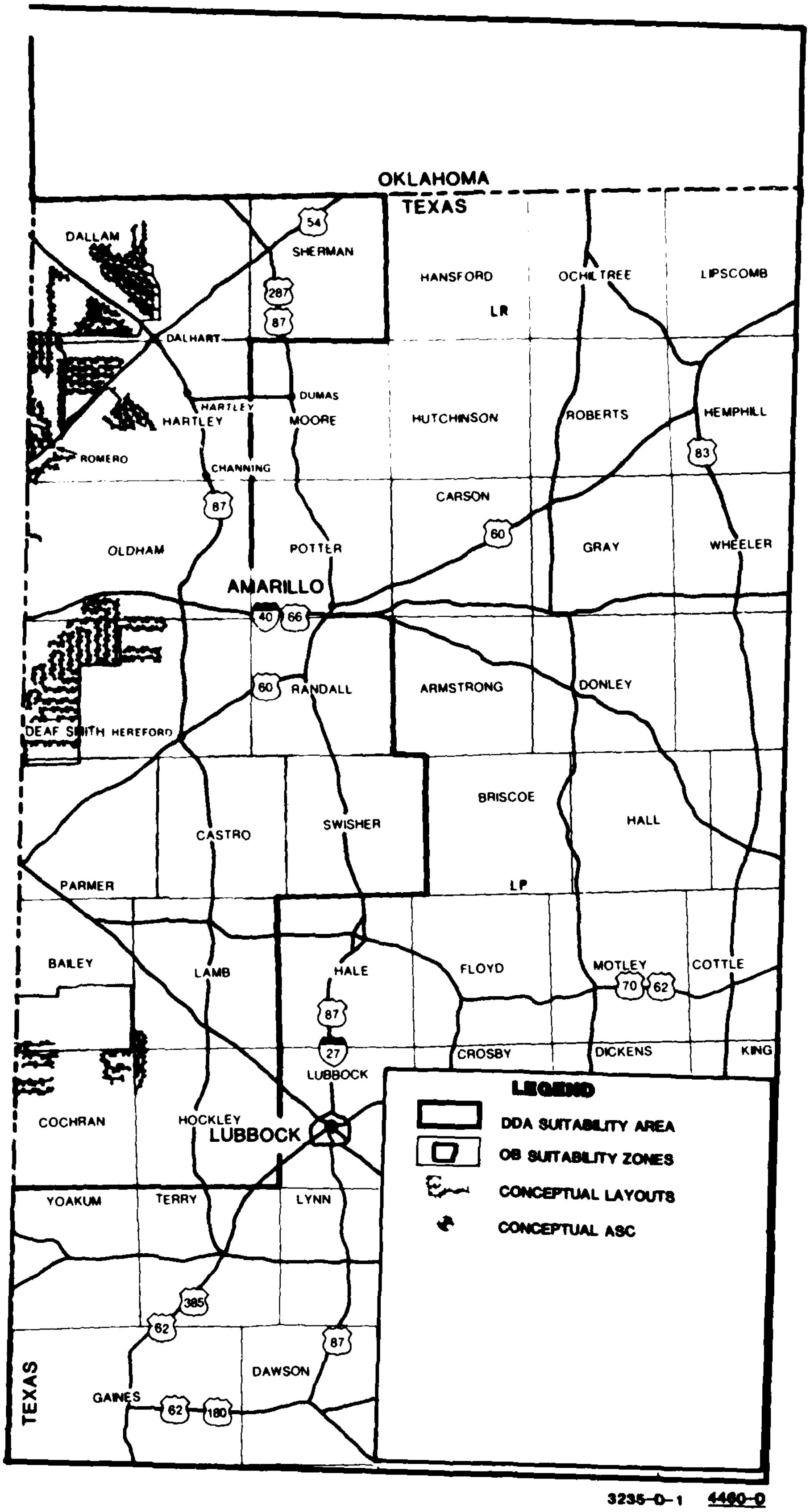


Figure 2.5-2. System layout for portion of Alternative 8, split deployment, Texas/New Mexico.

3.0 DESCRIPTION OF SYSTEM COMPONENTS

Construction of the M-X system is a large undertaking encompassing parts of two or four states and requiring approximately eight years to complete. Within the system various types of facilities are needed. The major facilities, two OB complexes, 4,600 protective shelters, and variable lengths of road, comprise the main work items for construction (see Figure 3.0-1).

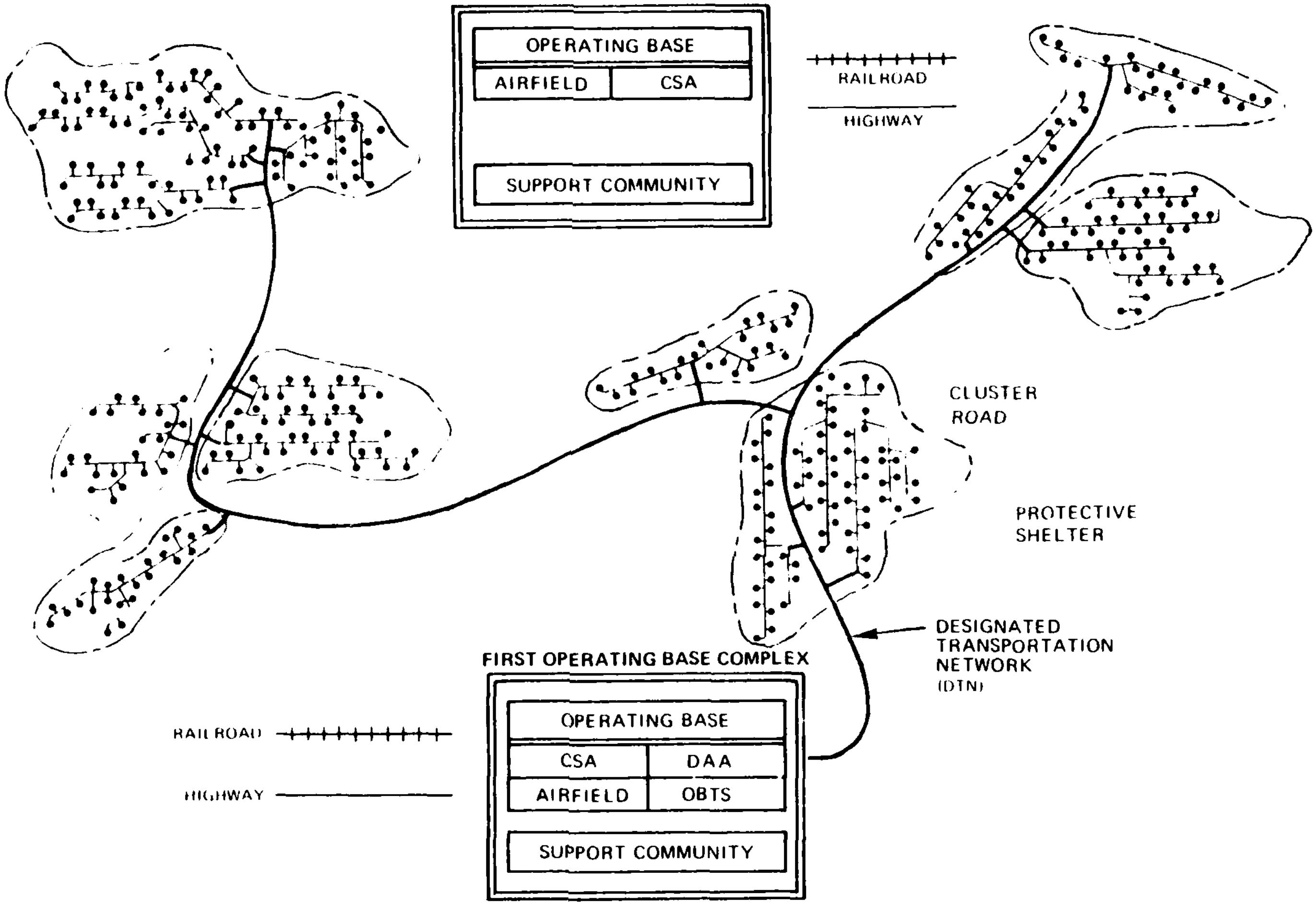
3.1 OB COMPLEXES

The two OB complexes are referred to as the first and second OB complexes. The major facilities in the first OB complex include the OB, the DAA, and the OBTS. Regardless of the deployment alternative selected, full or split, the first OB complex will always contain those major facilities. The second OB complex has only an OB with the full deployment alternative. With split deployment the second OB complex will also include a DAA. In no case is there an OBTS located in the second OB complex.

The OB provides operational control, maintenance, supply, rail/air offloading facilities, and other typical base support functions as well as housing and facilities for assigned personnel and families. The operations control center (OCC) will be located on the first OB; alternate OCC (AOCC) will be located on the second OB. The OB technical support facilities consist of OCC and AOCC, telephone exchange, electronic maintenance labs, missile guidance and control (G&C) system, warehouses, electrical/mechanical maintenance, and security response force. In addition to these technical facilities, the OB will contain over 100 housing, administration, recreational, and service facilities to support the full-time assigned personnel. The design of the OB is undergoing modifications which may change the composition and/or size.

The DAA facilities are designed to support missile, canister, launch, and transporter assembly, to house intermediate-level maintenance, and to provide weapon system storage. The principal facilities of the DAA are the missile assembly buildings (MABs), a munitions facility, and other support areas. Two MABs are planned; one for deployment assembly and the other for maintenance. The MABs consist of a high-bay assembly area, a low-bay storage and receiving area, an attached two-story support area, and an outside solid-stage loading pad. The munitions facility is a secure area that stores and provides working areas for processing and assembly of the reentry system and components. The support areas are general storage, service, maintenance, and administrative areas. The DAA facilities are also being modified, which may result in a change in its composition and/or size.

The OBTS is a system test facility located in the proximity of the DAA. Its purposes are to: support subsystem and system development tests; to process, integrate, and test weapon systems which require facilities located in a geological and climatological representative area; support follow-on test and evaluation efforts; perform technical data validation and verification; perform human factors/maintainability tests and evaluations; and support certain training activities. The OBTS will consist of the following facilities: a test-support building which houses unique test equipment; a CMF that will be similar to the ones deployed in the



Source: HDR Sciences, 1980.

Figure 3.0-1. Schematic of M-X system facilities.

operational area; physical security system (PSS) facilities also similar to operational; three protective shelters with ROSEE as similar to the operational version as is technically possible; cluster roads; primary/secondary access roads; remote surveillance site (RSS); and data link between the RSS and the PSS facilities. Modifications to the OBTS are underway, which may change the composition and/or size.

3.2 ROAD SYSTEMS

The three types of roads that support the M-X system are the DTN, the cluster roads, and the support roads.

DTN (3.2.1)

The DTN serves to connect the first OB complex to the DDA for the primary purpose of allowing transportation of the missile/canisters via the road special transport vehicle (RSTV) to the clusters. The DTN stops at the cluster side of the barrier, specifically at the stock fence line.

For the purpose of this FEIS, the DTN is a 24-ft wide road with 5-ft shoulders on either side. It has a 6-in. asphalt surface on a 10-in. aggregate base. Figure 3.2.1-1 is a typical section for the DTN. The DTN has a maximum profile grade of 7 percent and a minimum horizontal radius of curvature of 500 ft.

CLUSTER ROADS (3.2.2)

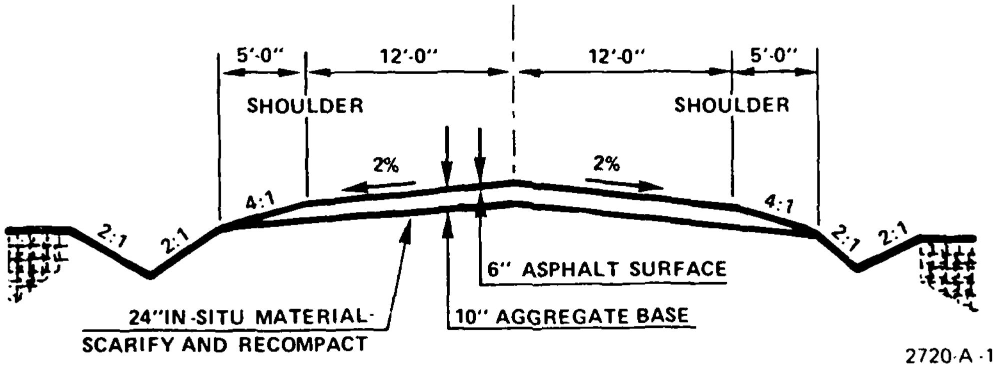
The cluster road joins the DTN at the barrier and connects the DTN to the cluster. The cluster roads allow the RSTV to proceed from the barrier area to the CMF, and the transporter to proceed from the CMF to the protective shelters in the cluster. The cluster roads include those roads which pass by all 23 shelters and those which spur off the main cluster road to each shelter.

The cluster road used for this FEIS is either 21 or 27-ft wide, with 5-ft shoulders on either side. The cluster roads that spur off the main cluster road to each shelter are 21-ft wide; the remaining cluster roads are all 27-ft wide. It has an aggregate surface depth of either 10 or 19 in., depending upon the type of subgrade it is placed on. Figure 3.2.2-1 is a typical section for cluster roads. The cluster roads have a maximum profile grade of 10 percent and a minimum horizontal radius of curvature of 500 ft.

SUPPORT ROADS (3.2.3)

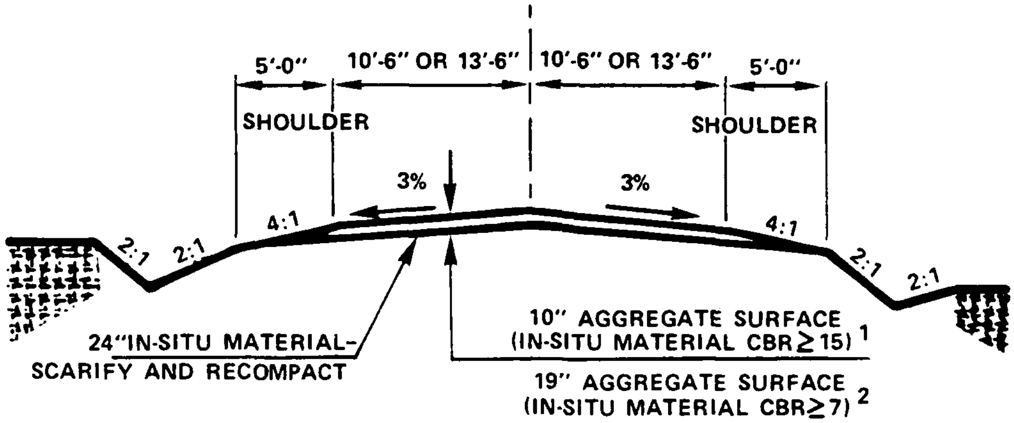
The support roads are of three types: access, intercluster, and SALT monitoring port (SMP) roads. The access support roads connect the DTN or the cluster roads to support facilities such as the CMF, the RSS, the ASC, and the power distribution centers. The intercluster support roads connect adjacent clusters with roads over which the transporter or RSTV cannot pass. The SMP support roads permit access from the cluster roads to the top of the shelters to support SMP cover removal/replacement operations.

The support road used for this FEIS is either a 10 or 20-ft wide road with a 5-ft shoulder on either side. The access support road and the intercluster support



Source: HDR Sciences, 1980.

Figure 3.2.1-1. DTN typical section.



1 80 PERCENT OF TOTAL CLUSTER ROAD MILEAGE ASSUMED IN THIS CATEGORY

2 20 PERCENT OF TOTAL CLUSTER ROAD MILEAGE ASSUMED IN THIS CATEGORY

SOURCE: HDR SCIENCES, 1980

2721-A-2

Figure 3.2.2-1. Cluster road typical section.

road are 20-ft wide and have a 6-in. thick aggregate surface. The SMP support road is a 10-ft. wide graded earth road. Figure 3.2.3-1 is a typical section for support roads. The access and intercluster support roads have a maximum profile grade of 10 percent while the SMP support roads have a maximum profile grade of 20 percent. All three types of support roads have a minimum horizontal radius of curvature of 100 ft.

3.3 PROTECTIVE SHELTERS

Figures 3.3-1 and 3.3-2 show the shelter design used in this FEIS. The protective shelter is a reinforced concrete tube 171 ft 3 in. long with an inside diameter of 14 ft 6 in. and a wall thickness of 1 ft 9 in. The inside of the tube has a steel liner 1/4 in. thick. The closure is also made of reinforced concrete with a steel liner. Figure 3.3-3 shows the closure in detail.

The two monitoring ports shown in Figure 3.3-1 are 10 ft 6 in. long in the direction of the longitudinal axis of the shelter. The width of the ports is determined by projecting a 90 degree view angle 45 degrees either side of the vertical, perpendicular to the centerline of the tube.

The protective shelter is buried under 5 ft of earth. This earthen berm is retained by a steel sheet piling headwall at the closure end.

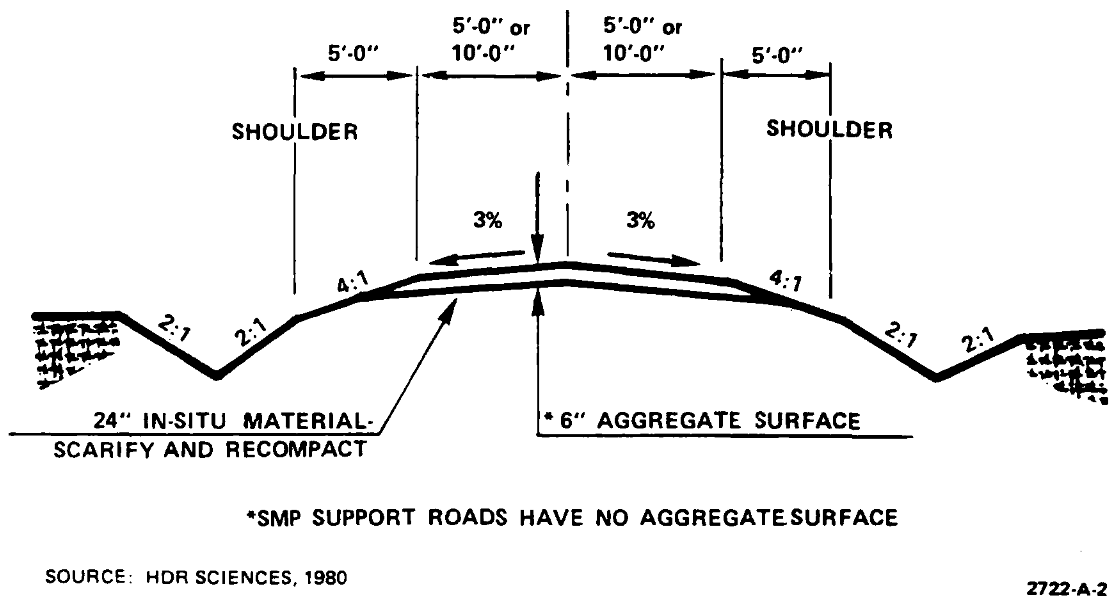
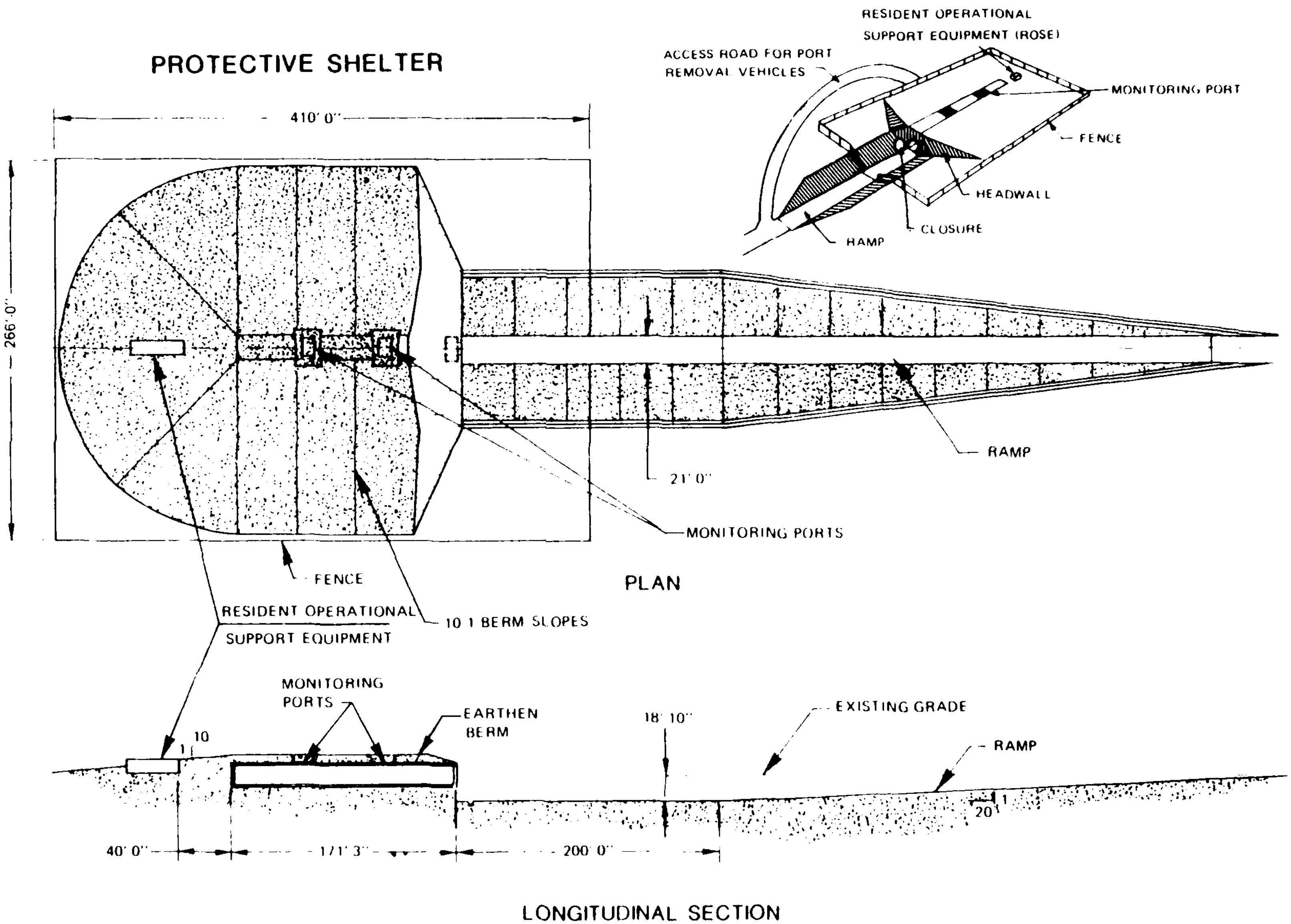


Figure 3.2.3-1. Support road typical section.



SOURCE: R.M. PARSONS CO., JUNE 1980

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Figure 3.3-1. Protective shelter configuration, plan, and longitudinal section.

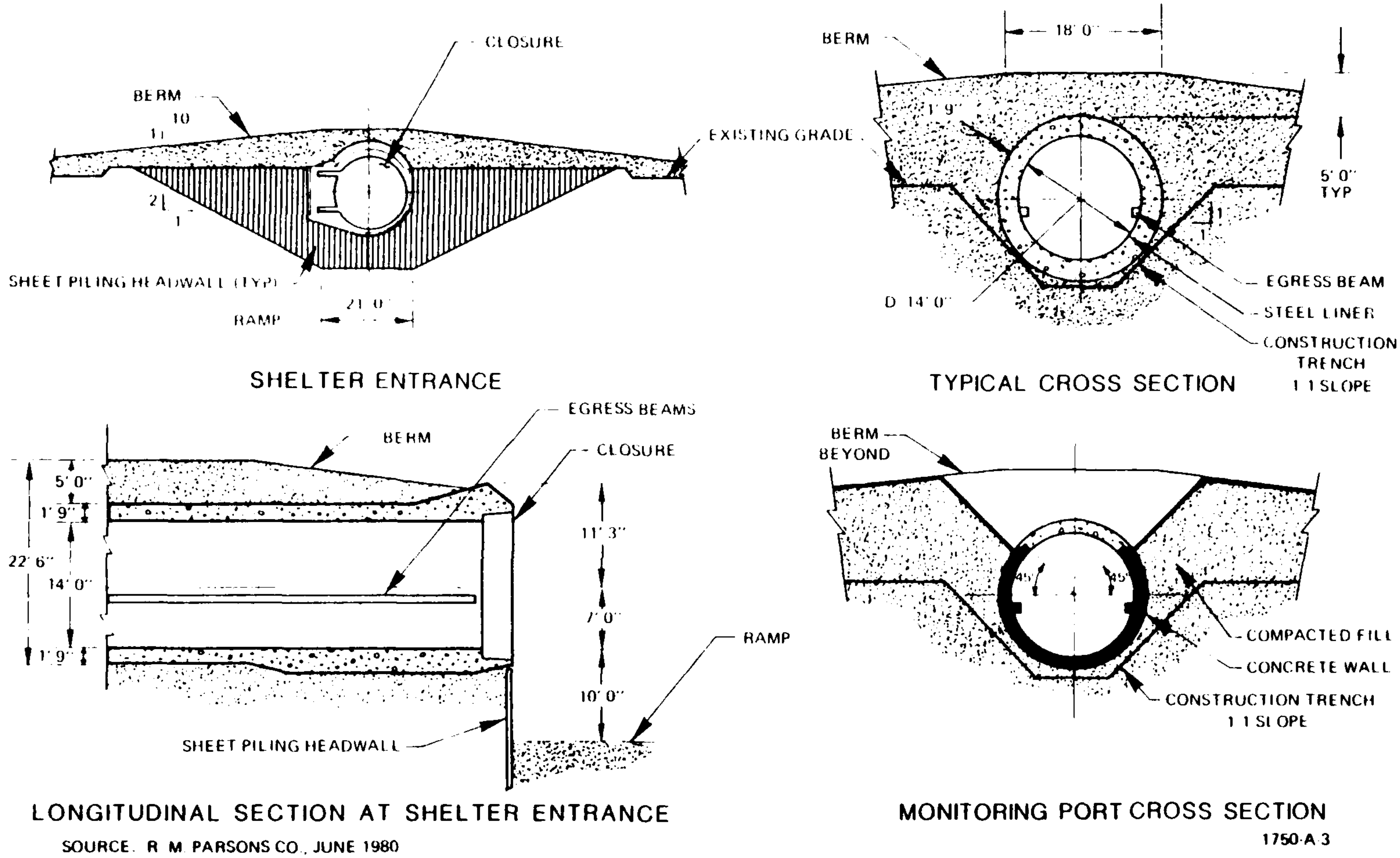


Figure 3.3-2. Protective shelter configuration, cross sections.

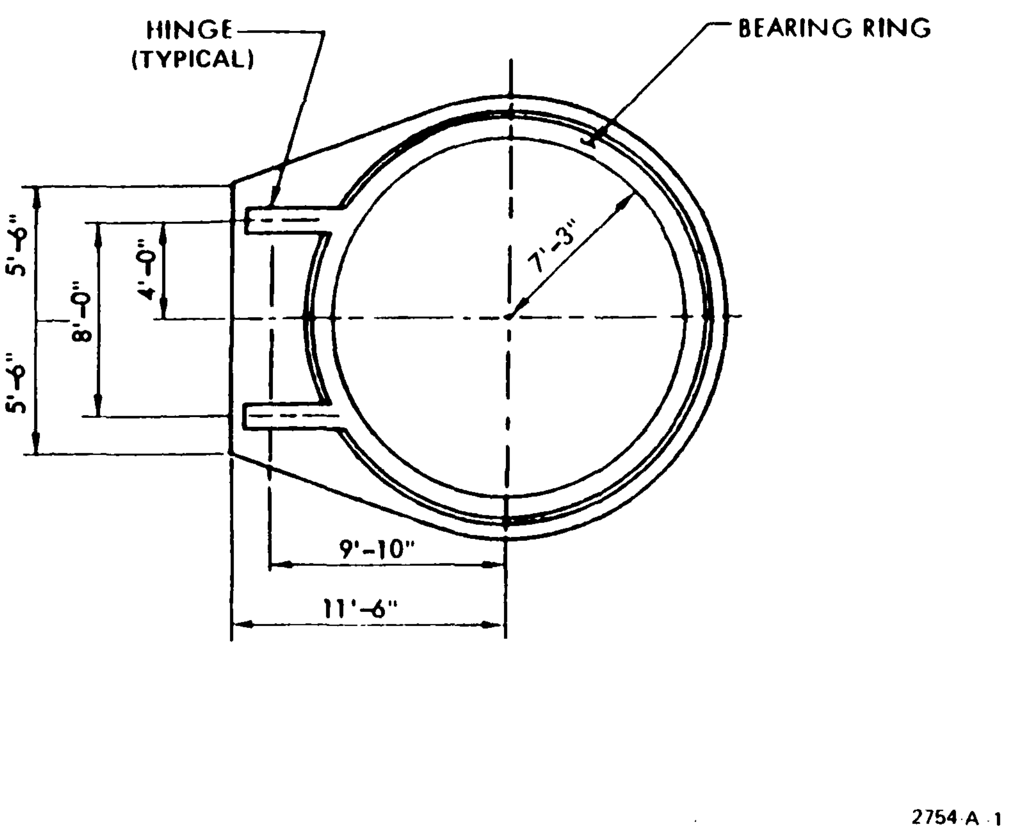


Figure 3.3-3. Protective shelter closure.

4.0 CONSTRUCTION PLANNING

The construction plan determines the temporal and spatial sequence in which individual project facilities are constructed. The schedule for construction of the two OB complexes is reasonably established, as is the overall schedule for DDA construction. However, the detailed scheduling of the individual segments of the DDA is not established except for the IOC clusters, which must be completed first. Two construction planning approaches considered for the DEIS were the sequential method and the concurrent method. The construction planning approach used and analyzed in this FEIS is the modified tree method.

For each method, the system is divided into several construction groups (20 in the Proposed Action). The differences in the order of construction of the groups characterize the major differences between methods. The environmental and socioeconomic effects of the methods are a result of the intensities of the construction activities within each specific region, and not necessarily from the total amount of activity required to construct the entire system, which is the same for all methods. Since the total construction time allowed for completion of the project does not change with the method, the intensity of the construction activities in a region characterizes the differences between the methods. This is because the number of regions that have construction activities occurring simultaneously, and the intensity of activity within them is different for the sequential method than for the concurrent method.

4.1 SEQUENTIAL METHOD

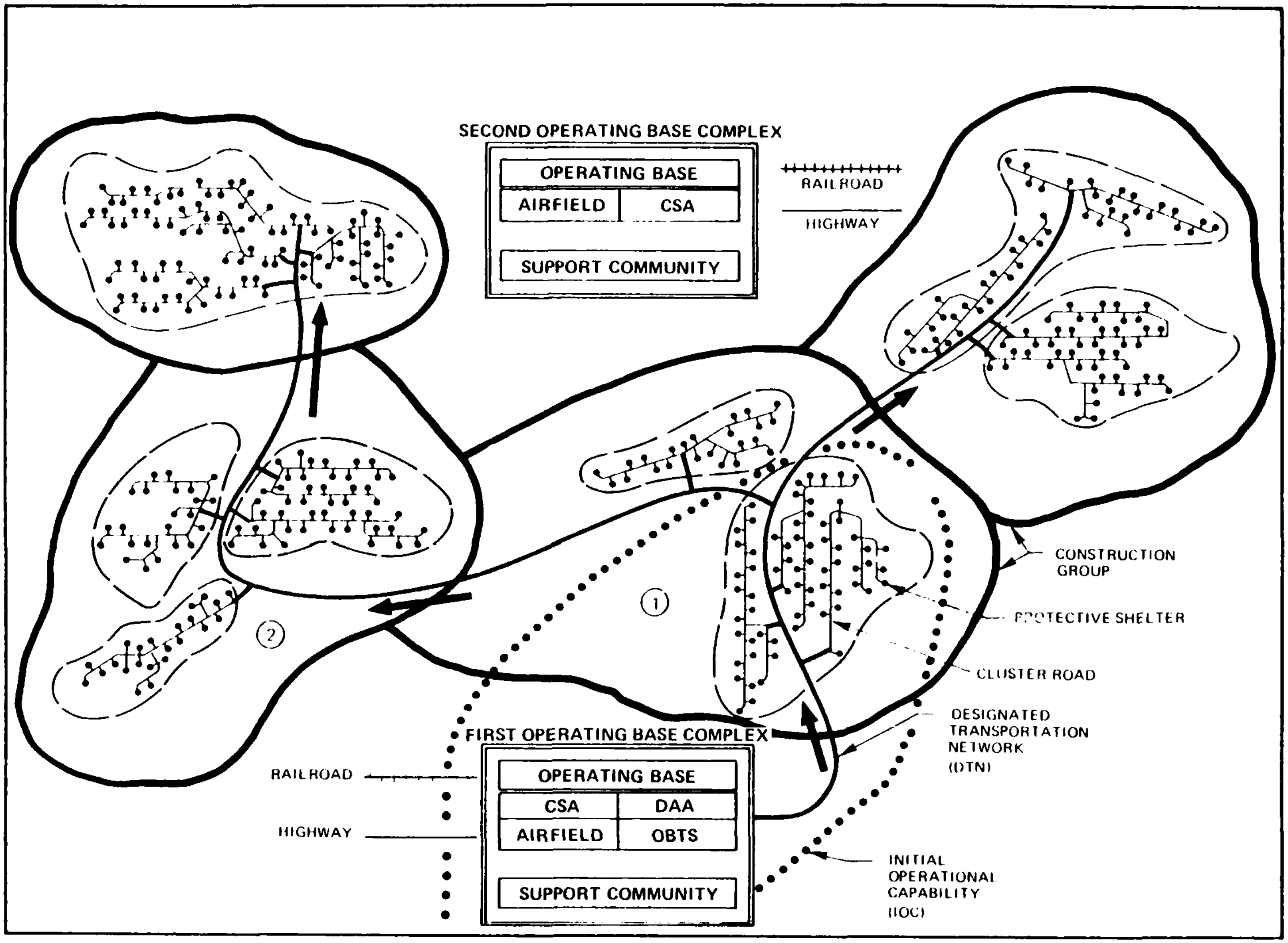
The sequential method begins by constructing the first OB complex, then the IOC clusters, and then progressing outward. Figure 4.1-1 is a schematic diagram of this method. Generally a large workforce is concentrated in a relatively small area (group 1 in the diagram) until work is completed in that group and then moves to the next adjacent group (group 2 in the diagram). A small amount of construction activity overlaps between groups during the move from one group to the next. The work within each group begins with the DTN, followed by the cluster roads, and ends with the protective shelters and other facilities.

The sequential method has several advantages from an operations point of view. Completing adjacent clusters sequentially, starting from the first OB complex, allows missiles within the same geographical areas to be deployed at approximately the same time. Fewer security and operations personnel are needed since the missiles are located in the same general area. All the utilities within the DTN right-of-way, particularly the C^3 system, are connected as they are completed, to the OB complex.

The operational advantages could be offset by some adverse environmental and socioeconomic effects. Large numbers of construction personnel are concentrated in relatively small areas for a short period of time, thus intensifying the impacts rather than spreading them out over a larger area.

4.2 CONCURRENT METHOD

As in the case of the sequential method, the concurrent method also begins by constructing the first OB complex and then the IOC clusters. However, shortly



Source: HDR Sciences, 1980.

Figure 4.1-1. Schematic of M-X facilities development, sequential.

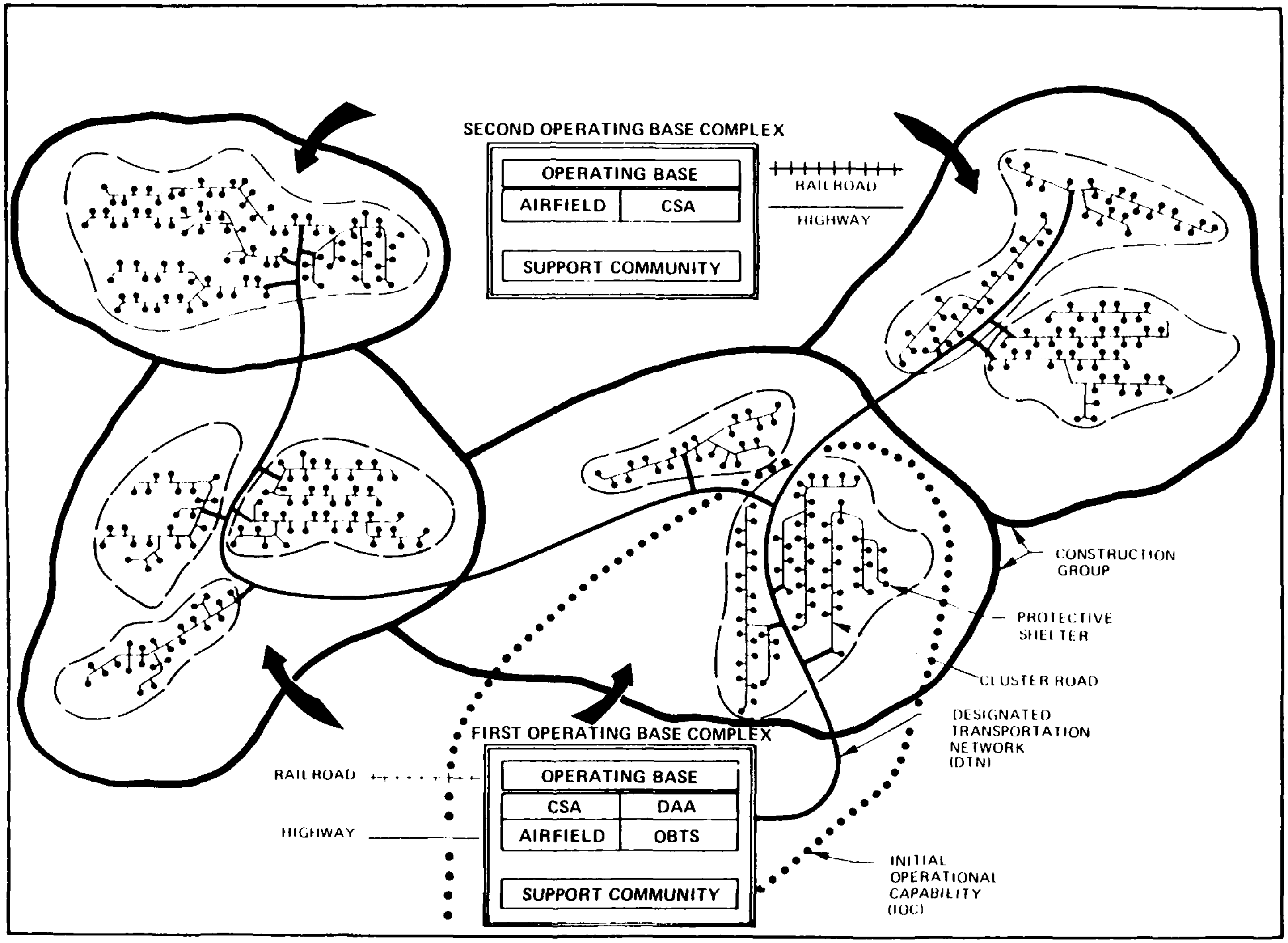
after construction starts in the IOC clusters, additional construction activities start in other groups in other regions remote from the initial group. This is shown schematically in Figure 4.2-1 (in the diagram all four groups would be constructed at the same time). The order of construction within a group is the same as the sequential method: that is DTN, then cluster roads, and then protective shelters.

The major advantage of the concurrent method is that the work force is spread out over several regions, which tends to mitigate some of the adverse environmental and socioeconomic impacts associated with the concentrated activity as characterized by the sequential method. The demands for other resources, such as water and electrical energy, are also dispersed over a large area.

The disadvantages of the concurrent method are generally operations oriented. Since completed clusters are not always contiguous, more security and operations personnel are required. Additionally, it would be necessary to construct the DTN and communications facilities to all groups early in the construction schedule.

4.3 MODIFIED TREE METHOD

The modified tree method is a hybrid of the sequential and concurrent methods. It generally has all the advantages of the sequential and concurrent methods, without their disadvantages. See Appendix G for additional information on the modified tree method.



Source: HDR Sciences, 1980.

Figure 4.2-1. Schematic of M-X facilities development, concurrent.

5.0 CONSTRUCTION TASKS

5.1 MOBILIZATION

Mobilization involves the assembly of personnel, equipment, materials, and support facilities required to construct the M-X system. Included in this activity is the development of the following items:

- o Water wells
- o Material sources
- o Marshalling yards
- o Construction camps
- o Temporary power

WATER WELLS (5.1.1)

Water wells will be developed approximately every 30 mi along the DTN, at the construction camps, concrete plants, and at each cluster. Whenever possible, these wells will be made a part of the permanent water system required for the operation of the M-X system. When the wells are temporary and only required for construction uses, temporary portable distribution and storage facilities will be used. These facilities will be relocated as construction progresses. During construction, the wells will supply domestic and construction requirements. After construction is completed, the major demand will be for domestic use at the OB complexes.

MATERIAL SOURCES (5.1.2)

Two types of material sources are required for the project--sand and gravel deposits, and mineable rock formations. These sources may not be located within the project area. The methods of obtaining the aggregate will be the same whether the sources are located within the project area or not, the only difference being the haul distances required to deliver the aggregate to the manufacturing plants.

Aggregate pits will be used to provide sand and gravel for construction and will be located based upon the latest geotechnical data available. At each location, mining, washing, stockpiling, and loading operations are required to provide material for the production of concrete, railroad ballast, road base and surface courses, and asphalt paving.

When sand and gravel are deficient in size or a higher grade of material is required, quarrying operations will be necessary to provide suitable rock for the manufacturing of additional aggregate.

Aggregate manufacturing plants are used to process quarried rock. This processing includes crushing, washing, sizing, and sorting. Material sizes produced vary from coarse to sand-size aggregate.

During plant operations, the aggregate is washed to remove deleterious materials and the fines produced during crushing. This wash water flows to settling

ponds where these materials are removed and the water recirculated through the plant.

Equipment requirements for an aggregate manufacturing plant vary greatly according to the number of different gradations (sizes) of aggregate required. Figure 5.1.2-1 is a diagram of a typical aggregate manufacturing plant that produces sand, and aggregate for road base or surface, asphalt paving, or concrete.

MARSHALLING YARDS (5.1.3)

Marshalling yards will be developed near the perimeter of the deployment area acting as the receiving and storing sites for equipment and materials. If possible, a marshalling yard should have railroad and highway access. Marshalling yards will probably be set up near the OB locations. Additional marshalling yards are desirable in other regions remote from the OB since this will cut down on the haul distances from the yards to construction sites.

Equipment and materials will be received at the marshalling yards and will be inventoried, labeled, and put into temporary storage. When needed, the equipment or materials will be trucked to the construction sites. Equipment and materials should be handled a minimum number of times to ensure economy of construction. However, additional storage may be required at the concrete plants and the steel fabrication and assembly areas.

CONSTRUCTION CAMPS (5.1.4)

The construction sites generally will be too remote for workers to locate their families in nearby communities and commute to work on a daily basis, although there will be situations where this is possible. Therefore, temporary construction camps will be established to support the work force. It is assumed that these camps would provide housing for one-half the workers without families. Construction workers would either leave their families where they are, or would move them to some community within commuting distance of the construction sites, if possible.

Construction camps could consist of the following temporary facilities: dormitory, mess hall and kitchen, recreation building, theater, infirmary, and maintenance shop. Central management offices and a heavy vehicle maintenance yard would be adjacent to the camp, as would be the truck head for receipt of incoming material. All of these personnel facilities would be serviced by a portable sewage disposal plant. The major production facilities would include water wells, a sand and aggregate plant, settling ponds, and possibly a concrete plant. Figure 5.1.4-1 presents a conceptual layout of the construction camp and production facilities.

The initial construction camp will be established at the first OB complex location. This camp will house the personnel that will construct both the first OB complex and the initial portion of the DTN. The first workers will live in self-contained trailer-type units with their own water supply, cooling, and sewage disposal. Some of the workers may have to live offsite and commute to work by bus or automobiles. This camp will have to support approximately 1,500 construction workers during the peak year.

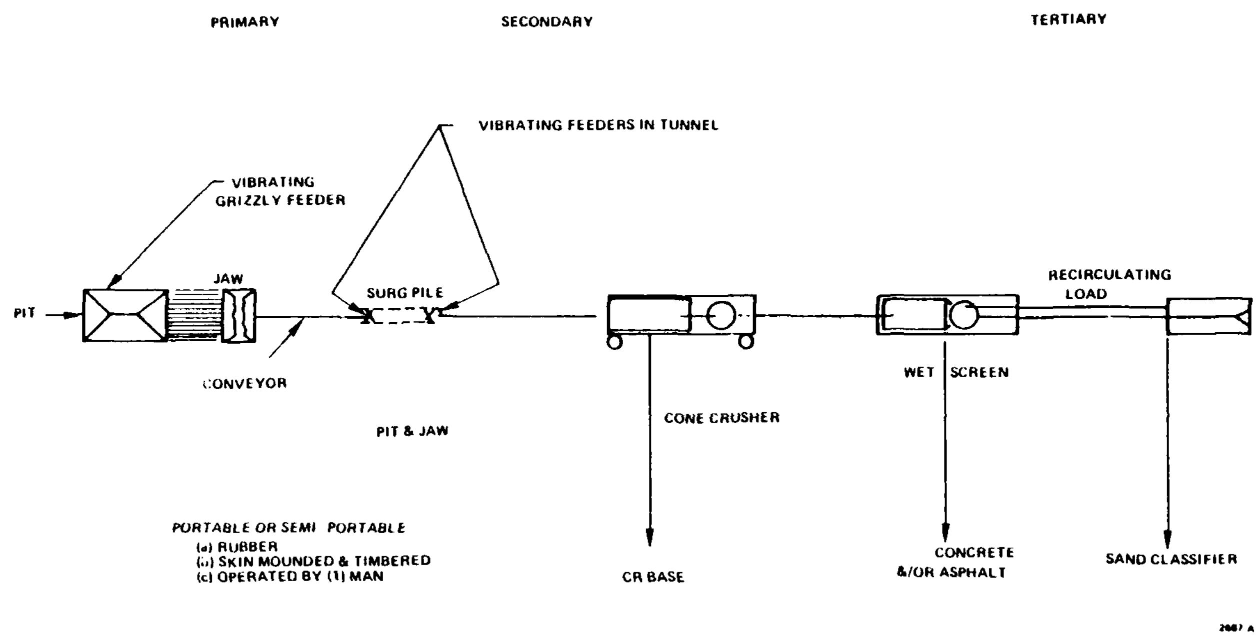


Figure 5.1.2-1. Aggregate manufacturing plant.

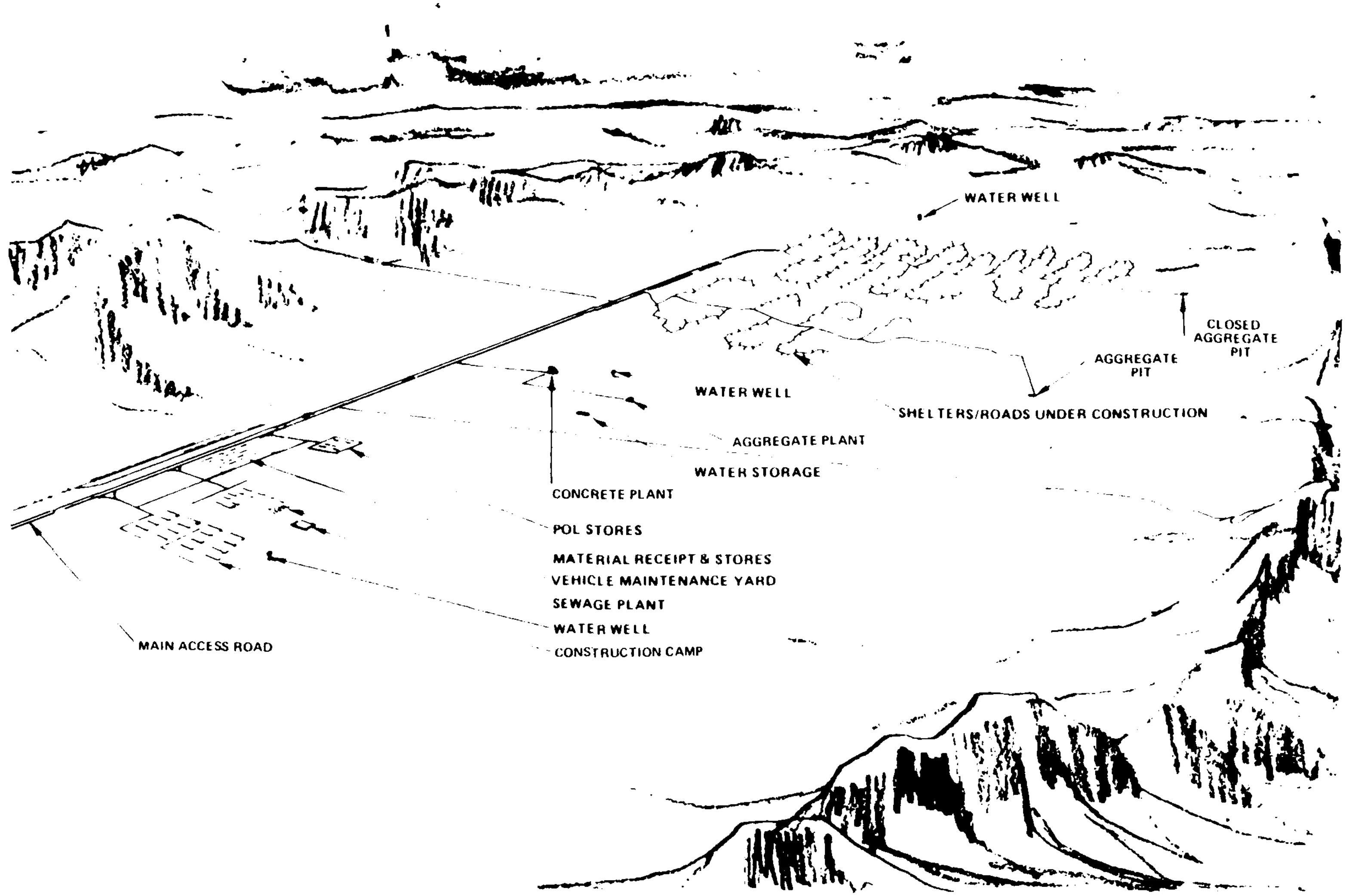


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Figure 5.1.4-1. Construction camp facilities.

The second construction camp will be established in the initial construction area in the DDA soon after the first camp. It will support DTN construction and the development of water wells and aggregate sources. As the construction expands, the erection of concrete plants and the development of material storage areas will be required to support the construction of the cluster roads, protective shelters, and other DDA facilities. Some of the facilities in the construction camp could become permanent if the camp is located where an ASC will be. The remaining facilities will be relocated to another area.

The number of construction camps varies with the siting alternative. Generally there will probably be up to 20 total camps required with a maximum of about 1,500 construction workers at a given camp during the peak period of construction.

TEMPORARY POWER (5.1.5)

Temporary power for construction will probably be provided by diesel-powered generators, since most of the existing utility distribution systems are either not adequate to provide for the construction demands or do not have powerlines near the camps. As construction progresses on both the M-X system and proposed local power projects, permanent power facilities will be added and could be a source for power in construction areas.

5.2 OB COMPLEX CONSTRUCTION

Two OB complexes are required for the M-X system. These are referred to as the first OB and the second OB. Associated with the OB complexes are a DAA and an OBTS. The first OB complex always includes a DAA and an OBTS. The second OB complex includes a DAA only when the deployment alternative is a split system, but it never includes an OBTS.

The structures in the OB complexes are expected to fall into five different categories: buildings with concrete walls and floors; buildings with concrete block walls and concrete floors; steel structures; structures of wood and stucco; and prefab facilities. Before any buildings can be constructed, roads and utilities, including water and power, must be available at the site. The contractors' support area (CSA) will have to be partially completed, and temporary housing set up. Large supplies of basic building materials will have to be brought in by truck, including crushed stone, cement, sand, wood, and plywood, some of which will have to be stored in suitable buildings. Water will have to be available for concrete, dust control, and general construction.

It is anticipated that accepted building construction methods will be used in the OB complexes. An exception would be in the construction of the protective shelters at the OBTS. Discussion of the construction methods for protective shelters can be found later in this section.

5.3 ROAD CONSTRUCTION

There are three types of roads required for operation of the M-X system: the DTN, cluster roads, and support roads. The length of each of these types of roads varies with the siting alternative and is discussed in Section 2 of this report. The

different roadway widths and structural sections required for each type of road have not been finally determined. Further discussion on this subject can be found in Section 3 of this report.

The DTN connects the first OB complex to the clusters, terminating at the barrier for each cluster. As presently conceived, it will have an asphalt surface on top of an aggregate base. The cluster roads connect each cluster to the DTN at the barrier and each protective shelter within the cluster. These roads are designed with an aggregate surface. The support roads provide access around the cluster barrier, provide access to the protective shelter for removal of the monitoring ports, and, whenever possible, provide intercluster access. The support roads have an earth or aggregate surface. Figure 5.3-1 shows the layout for these roads.

Road construction is a process whereby a strip of land is improved to provide a drivable surface for access. The major operations in this construction are surveying, clearing and grubbing, grading, drainage, scarifying and recompacting, aggregate base or surface, fine grading, and asphalt concrete surface (DTN only).

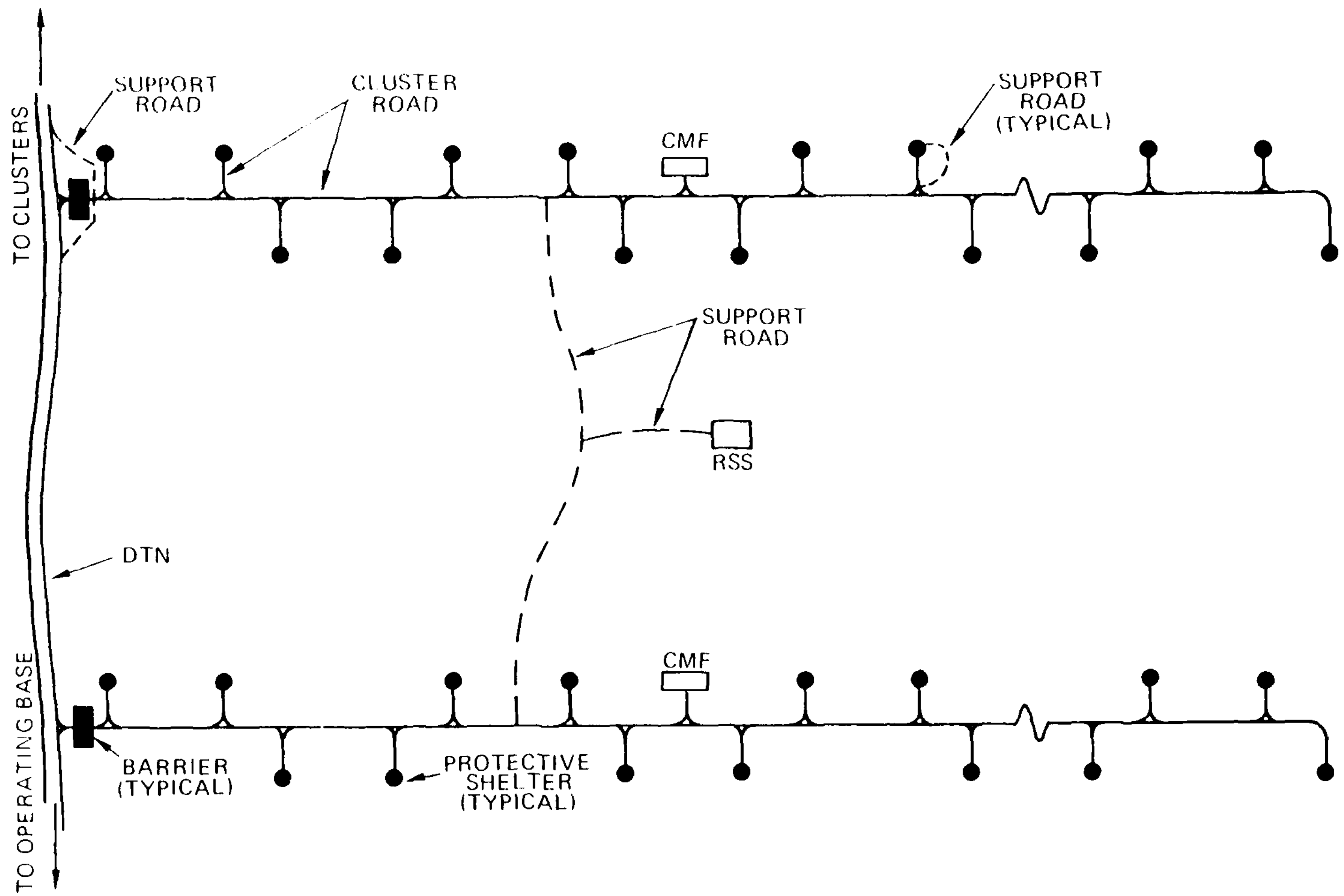
The first step in road construction is surveying to lay out the physical location of the road. After the alignment for the proposed road is identified, the strip of land is cleared and grubbed to remove all vegetation, boulders, debris, etc. from the proposed road corridor.

Once the corridor is cleared, earth-moving equipment is brought in to perform the rough grading operation. Grading is done to reshape the existing terrain into the roadway cross section along the proposed alignment to the approximate vertical profile. The roadway is designed, to the maximum extent possible, such that all excavated material will be used in the embankments so that no material will have to be wasted or borrowed from areas outside of the roadway corridor. As the roadway is brought to the proposed vertical profile, the embankment is compacted to a density greater than the existing soil, to create a solid foundation for the proposed road. To get the required density, moisture is added to the soil to form a compressible mixture that can be compacted in layers by tractors pulling heavy rollers and tampers. In areas where the roadway is excavated from existing ground, the underlying material is scarified (loosened by a plowing operation) and recompacted to the necessary density.

While rough grading is in progress, drainage structures are constructed at locations specified in the design. Drainage structures are located to accommodate both existing drainage ways that cross the road alignment and runoff carried by the ditches along the roadway. Each drainage structure is analyzed and designed to function properly with the hydrology and hydraulics of the basin through which the roadway passes.

The roadway is now fine-graded to the more exact dimensions required for the final roadway cross section. The travel way is crowned, the shoulders shaped and the ditches are smoothed to drain efficiently.

After the roadway has been fine-graded, the final pavement structure is constructed for the cluster roads and the DTN. The pavement structure in the case of cluster roads will consist of a dense layer of aggregate. DTN roads will be comprised of a similar layer of aggregate with an asphalt surface course.



Source: HDR Sciences, 1980.

Figure 3.3-1. M-X system roads layout.

The appropriate traffic control and informational signs, and pavement markings (striping) are installed to complete the road. As a final operation, the seeding and revegetation of disturbed roadway embankments and ditches is being considered.

The fundamental procedure for road construction described above typically uses conventional equipment (such as tractors, dozers, scrapers), performing each task as a separate operation. Also under consideration for the M-X roads system is an automated road builder (see Figure 5.3-2) capable of finish grading, stabilizing, and compacting a 24-ft wide road section at speeds up to 180 ft per minute.

5.4 PROTECTIVE SHELTER CONSTRUCTION

The protective shelter is a steel-lined, reinforced concrete tube approximately 171 ft long, with an inside diameter of about 14 ft and an outside diameter of about 18 ft (see Figures 3.2-1 and 3.2-2). Since there are 4,600 identical protective shelters required for the system, there are several methods of construction possible. The methods presently being considered are precast, mechanized cast-in-place, and conventional cast-in-place. Since the precast and mechanized cast-in-place methods require the use of special equipment and techniques currently being developed, a test program is being conducted to demonstrate their capabilities. The conventional cast-in-place method would use equipment and techniques that are commonly employed in concrete construction. The schedules and manpower estimates presented in this FEIS are based upon using the precast method for shelter construction.

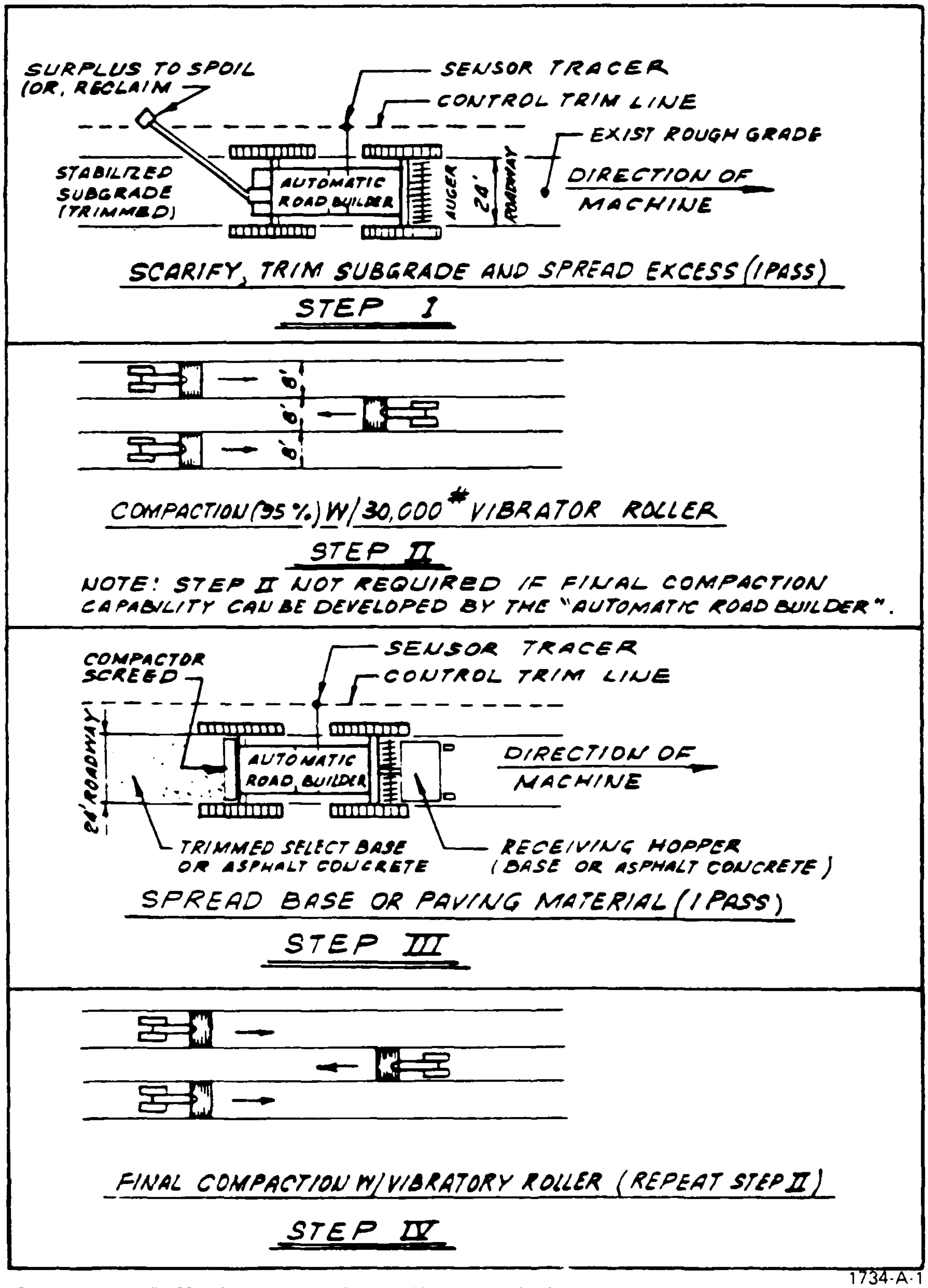
PRECAST METHOD (5.4.1)

Precast concrete construction is a method in which individual segments of the protective shelter are built at a centrally located plant, transported to the shelter sites, and assembled. The precast plant is set up near the construction camp and is portable, moving to several locations during the construction period. Aggregate sources and water wells are nearby. Storage areas for cement, steel, fly ash, and other materials are adjacent to the plant. Figure 5.4.1-1 illustrates a representative precast concrete plant.

Precast plants produce all the concrete segments and closures necessary to complete the protective shelters. There are basically four different types of segments required. One type is the end segment with one end of the tube solid and the other end open. Another segment is the normal type, both ends open. The third type of segment is the same as the normal segment except that it has a SALT monitoring port. All three of these segments have a constant cross section. The final type is a transition segment which is the segment next to the closure. This segment transitions from the constant cross section type to the closure.

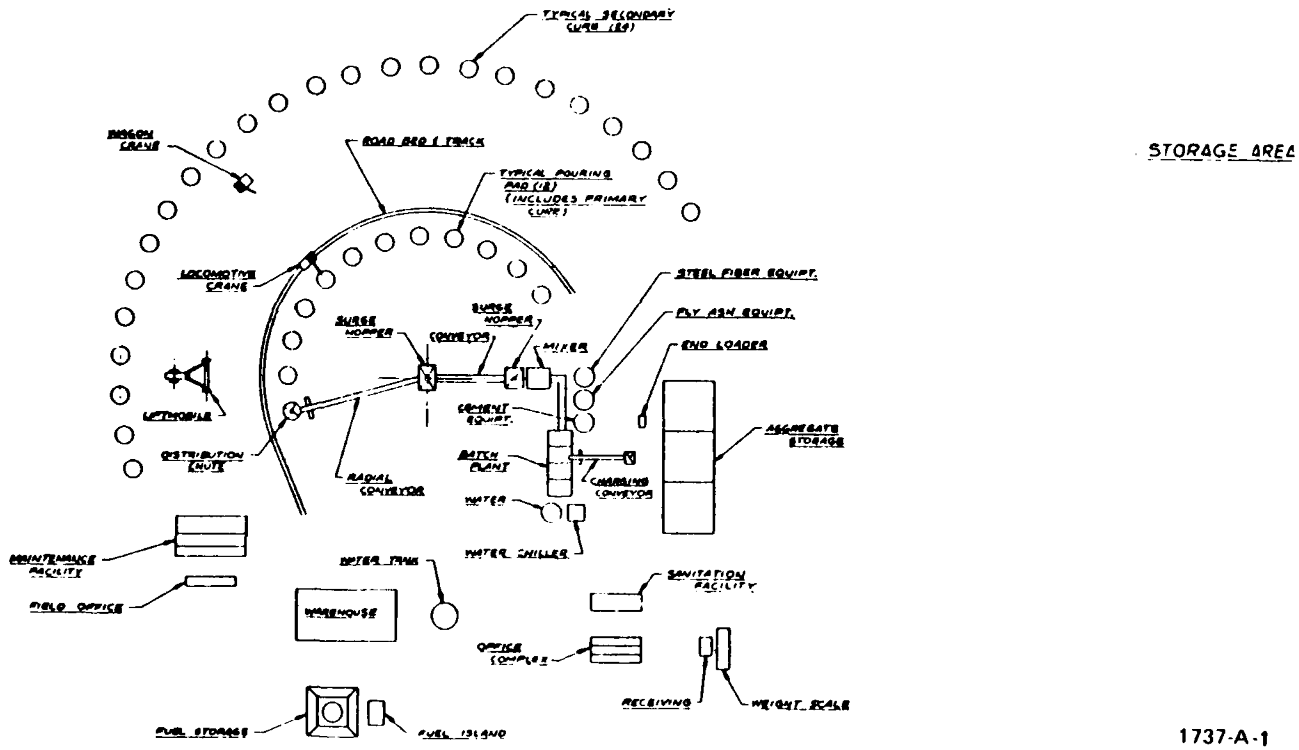
The major work items involved in the precast method are: excavating the trench and the ramp; pouring, transporting, and placing the precast sections; and backfilling the site.

Since many of the work items are repetitious and require the moving and/or placing of heavy articles or large quantities, the opportunity for developing specialized equipment exists. In fact, there are many companies presently engaged in studying the possibility of using some of the special equipment discussed later on.



Source: R.M. Parsons Co., March 1980.

Figure 5.3-2. Automated road builder.



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Source: R. M. Parsons Co., March 1980.

Figure 5.4.1-1. Precast concrete plant.

Excavation (5.4.1.1)

Two methods of excavating the trench and the ramp for the protective shelter are open cut excavation and contour excavation. Open cut excavation can be used for part or all of the shelter trench and for all of the ramp. If the open cut method is used for only part of the trench, the remaining excavation is performed by the contour method.

Open cut excavation involves a special machine which excavates a trapezoidal shaped section as shown in Figure 5.4.1.1-1. When this method is used for all the shelter trench excavation, the bottom of the trench is at the bottom of the concrete shelter. Precast concrete pads, or cradles, are then placed in the trench (see Figure 5.4.1.1-2) and the precast shelter segments are set on these pads.

Contour excavation also uses a special machine. If the contour excavation method is used for the shelter trench, excavating down to the springline of the concrete shelter section would still be done by the open cut method. Then the contour excavating machine would cut a semicircular trench with a radius equal to the outside radius of the concrete shelter, as shown in Figure 5.4.1.1-3. The precast shelter segments are placed in the contoured trench, using the precast concrete pads as in the open cut excavation.

In both the open cut and contour methods of excavation, the excavated material is carried to the surface by conveyors, where it is stockpiled for use in the backfilling operation.

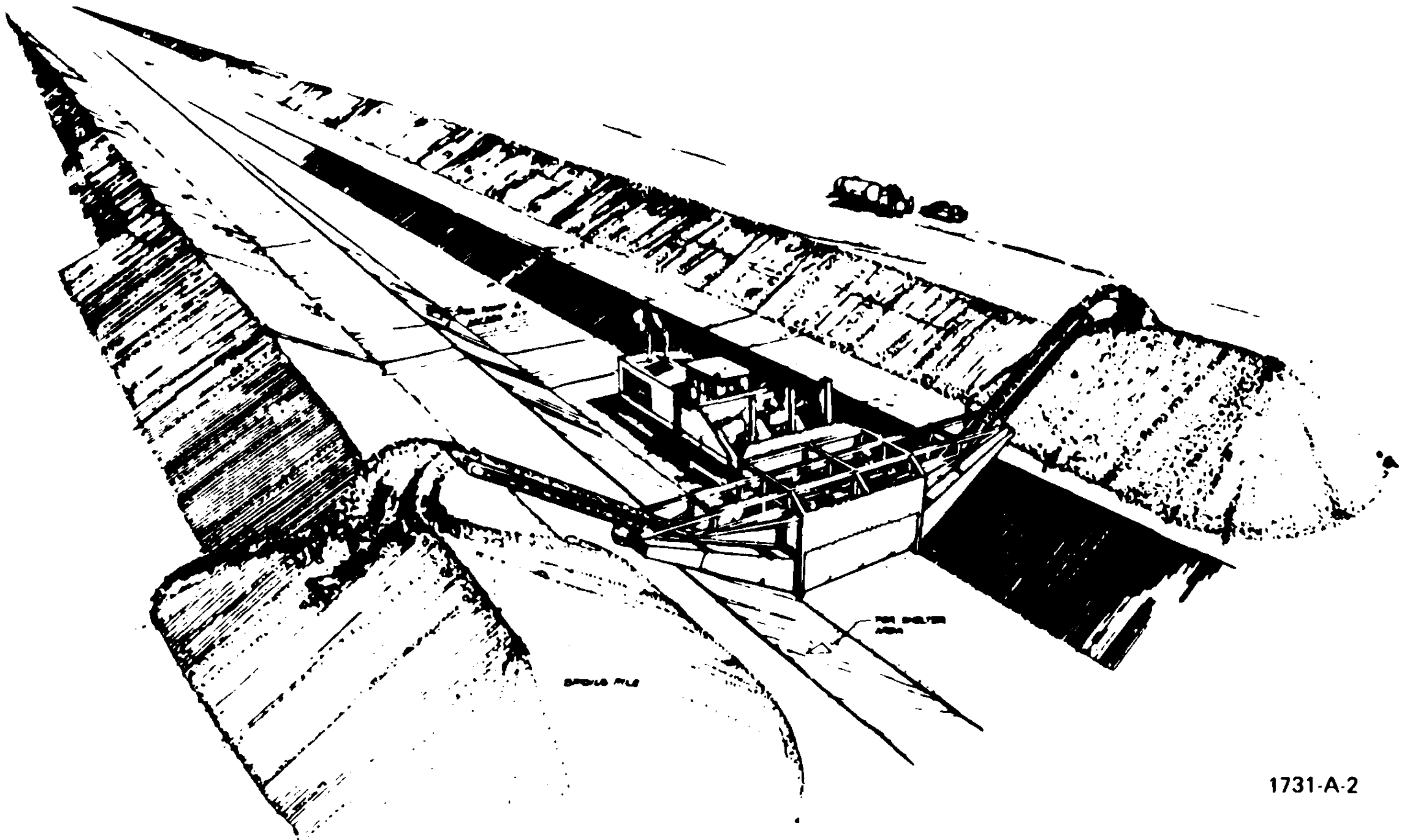
Precast Shelter Segments (5.4.1.2)

The precast method generally follows these procedures: First, cages of reinforcing steel and steel liners are assembled and moved to the casting area where forms are placed around the cages and concrete poured into the forms. After the concrete is vibrated to remove air pockets and to distribute the concrete evenly around the reinforcing steel, the concrete segment remains undisturbed until the concrete is hard enough for the forms to be removed. After removal of the forms, the shelter segments are stored until the concrete reaches its design strength and then transported to the protective shelter sites on special vehicles. Upon delivery to the site, the segments are placed in the previously excavated trench and mated to the abutting segment.

Several types of special equipment are necessary to manufacture, deliver, and place the precast protective shelter segments.

Special equipment capable of making the reinforcing steel/steel liner cages are needed. Figures 5.4.1.2-1 and 5.4.1.2-2 are conceptual drawings of what these facilities might be.

The precast protective shelter segments could weigh anywhere from 250 to 310 tons, depending upon the segment. In order to load unload and transport these segments, special equipment is required. One piece of equipment that could load the shelter segments onto the transport vehicle at the precast plant and unload the segments at the shelter site is called a pipemobile or a liftmobile. Figures 5.4.1.2-3 and 5.4.1.2-4 are examples of this type of special equipment. The heavy weight of a



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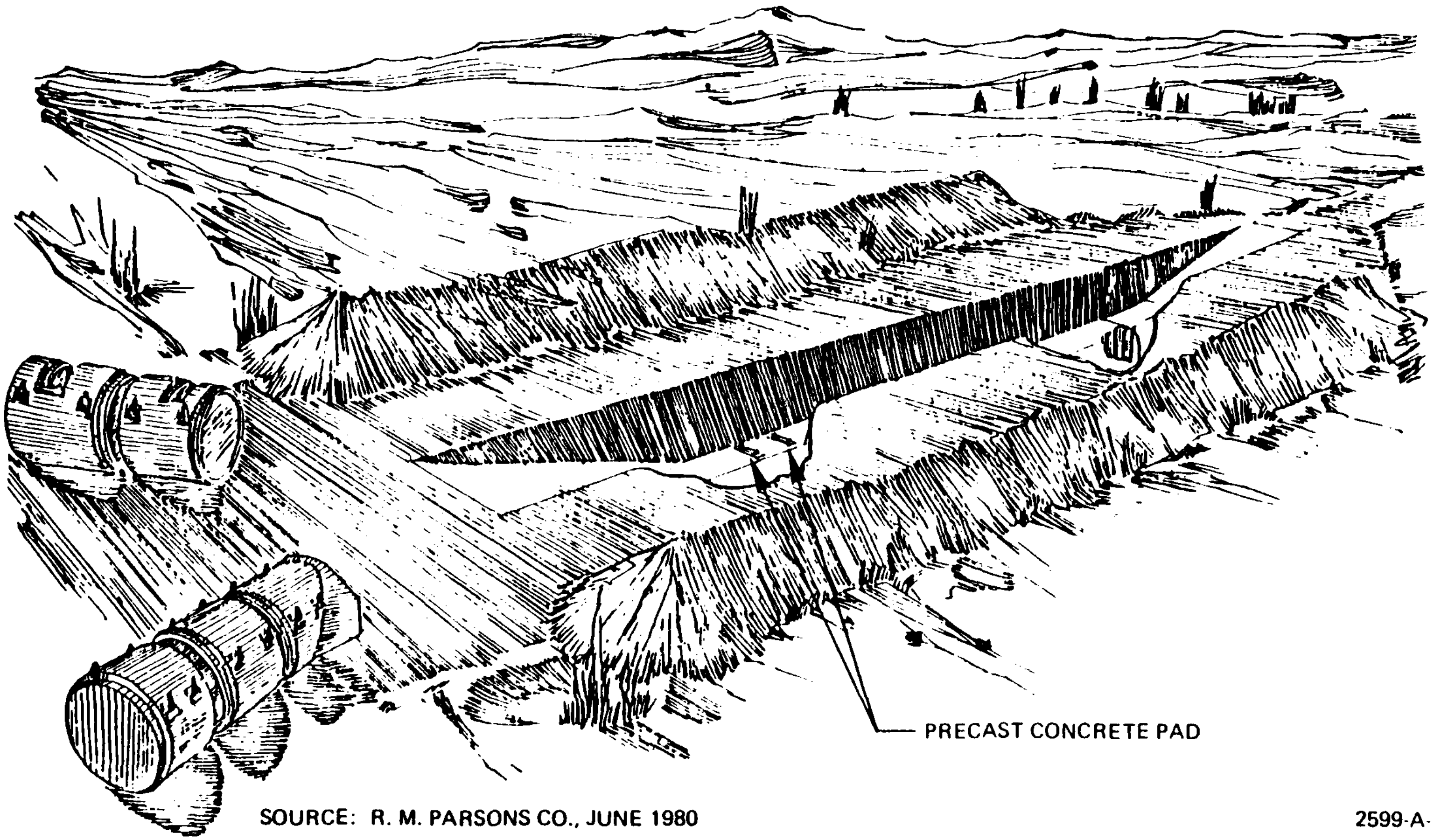
SOURCE: R. M. PARSONS CO., JUNE 1980

Figure 5.4.1.1-1. Open cut excavation.



SOURCE: R. M. PARSONS CO., JUNE 1980

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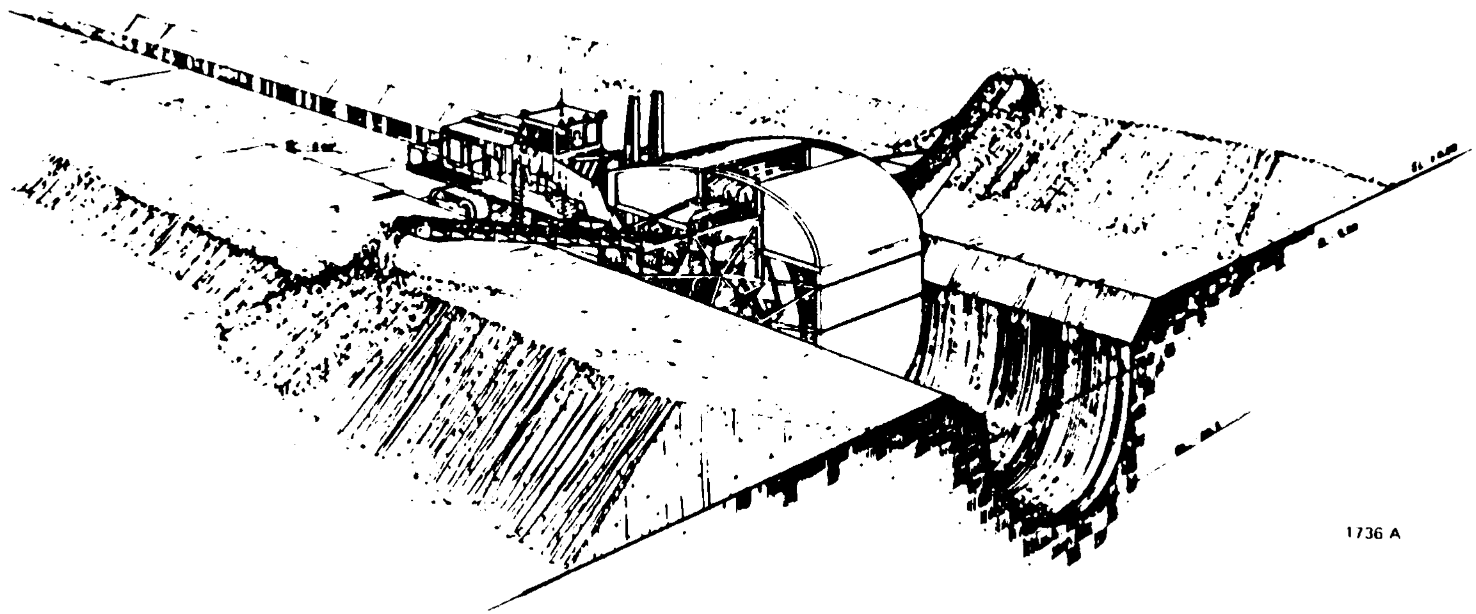
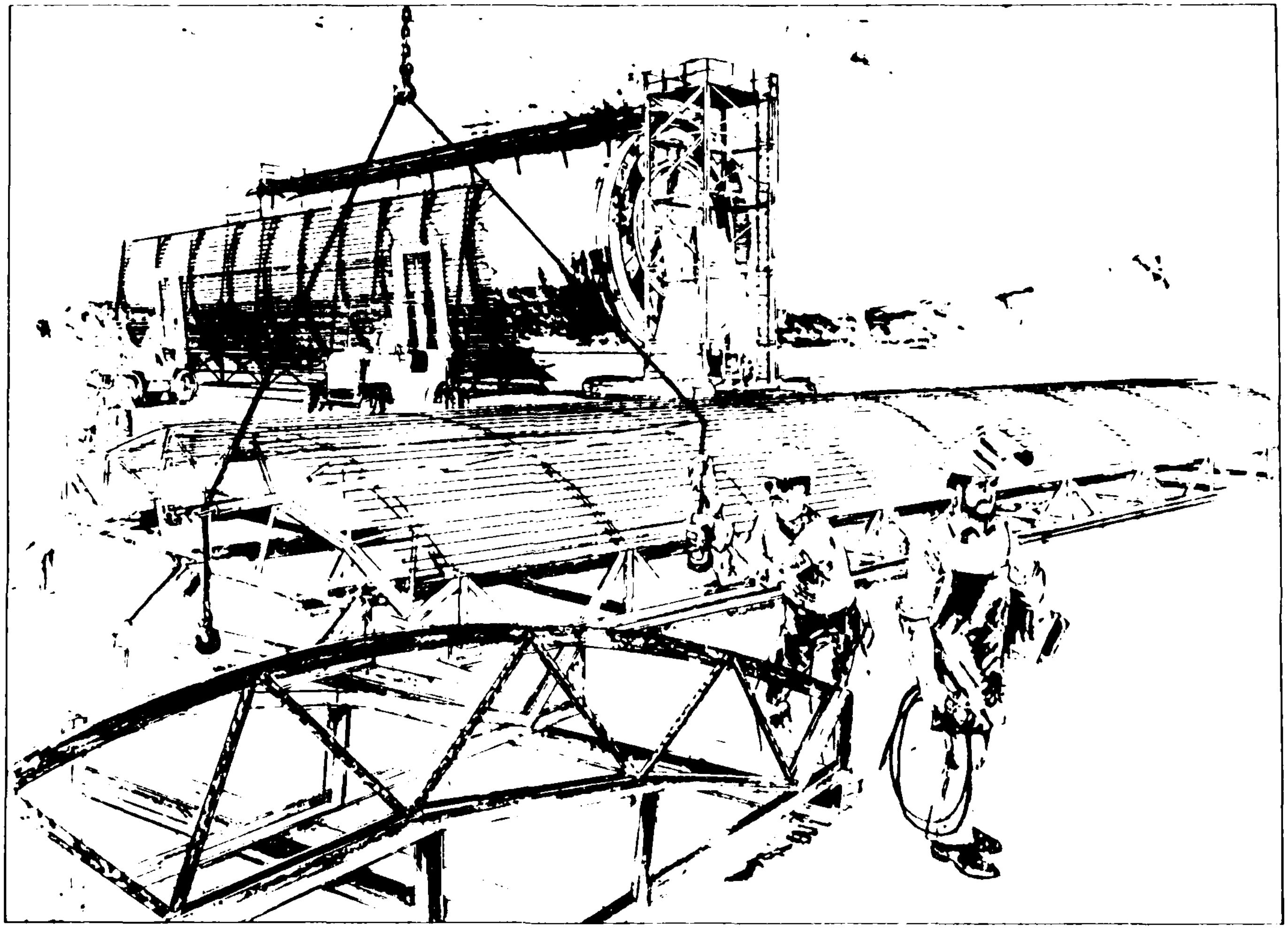
Figure 5.4.1.1-2. Open cut excavation, final excavation stage.



Source: R. M. Parsons Co., March 1980.

Figure 5.4.1.1-3. Contour excavation.



SOURCE: R. A. HANSON CO. INC., MAY 1980

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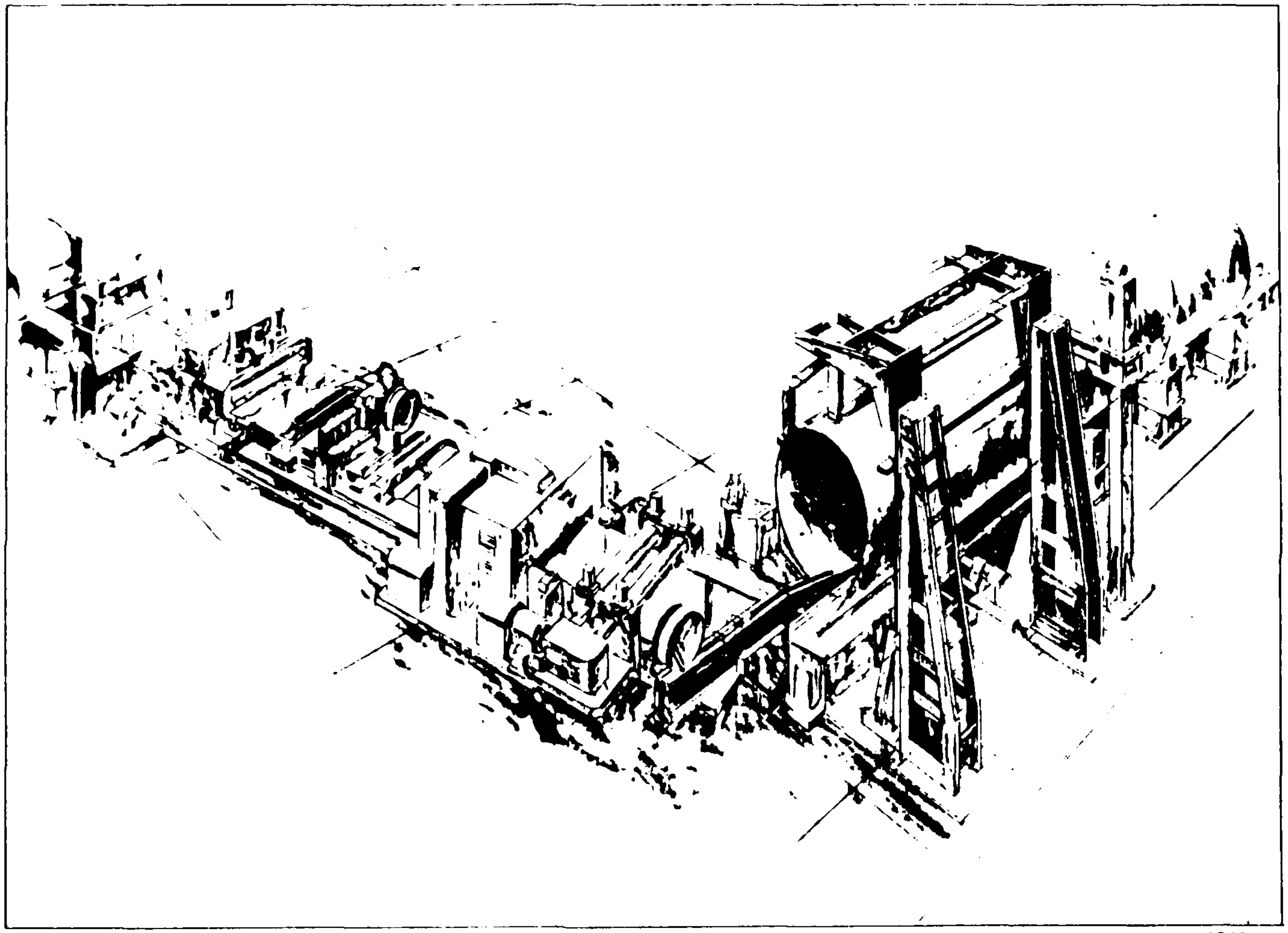
Figure 5.4.1.2-1. Liner/rebar fabrication facility.



SOURCE: R. A. HANSON CO. INC., MAY 1980

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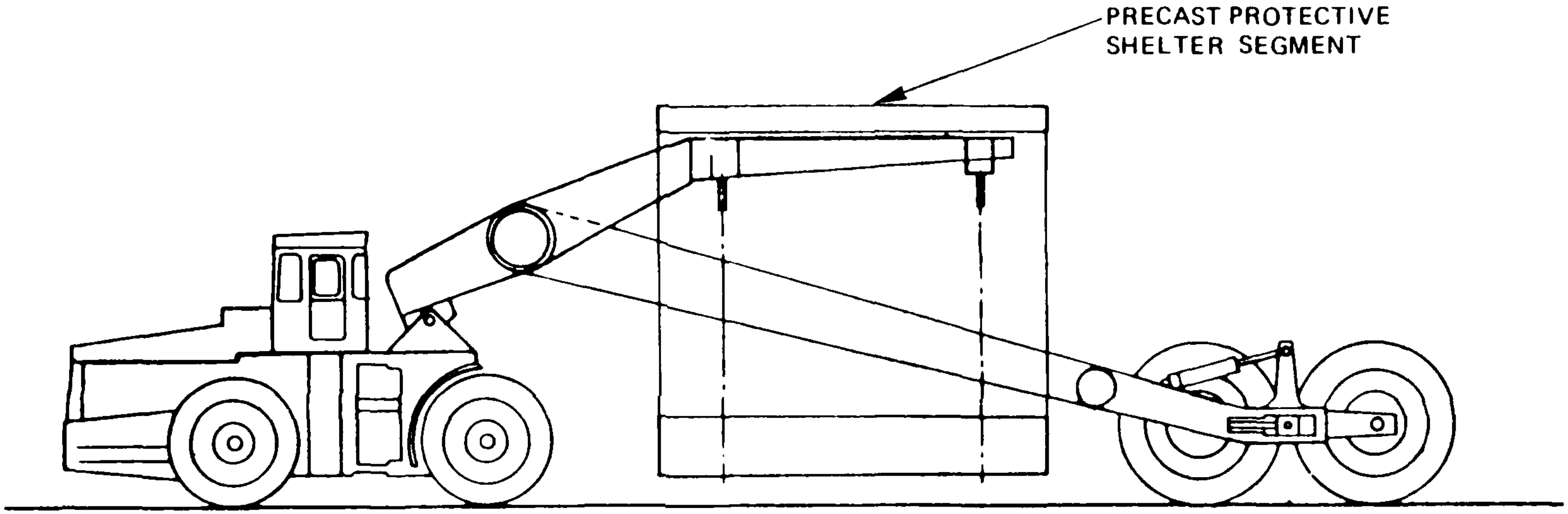
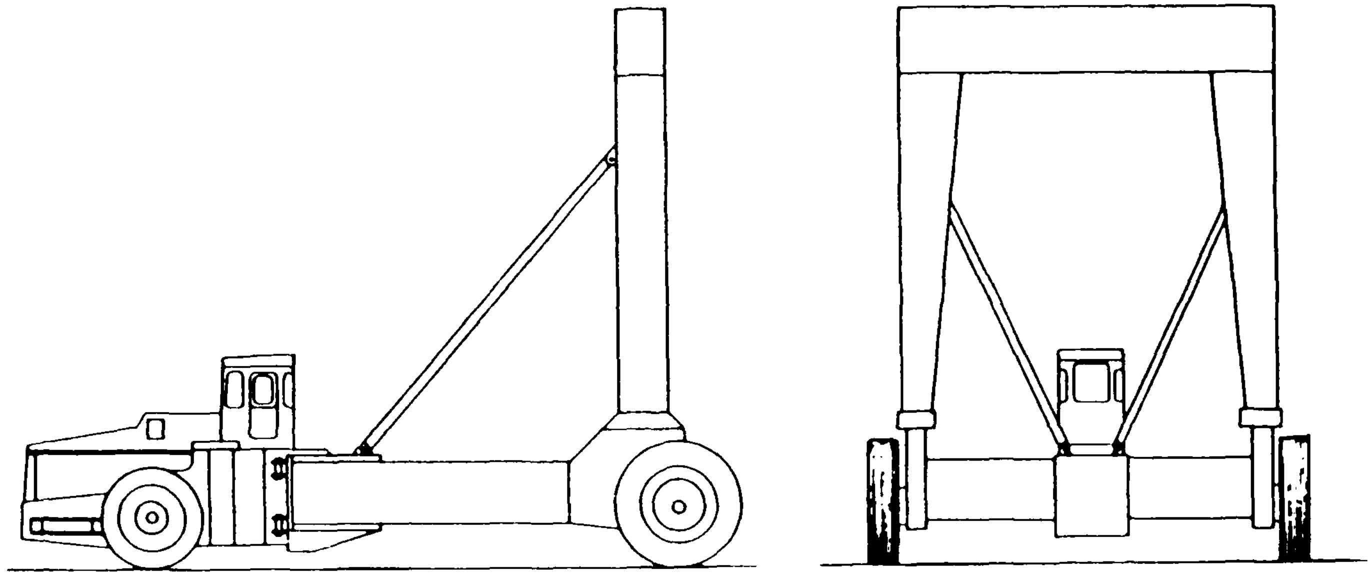
Figure 5.4.1.2-2. Spiral weld pipe mill.



Source: R.M. Parsons Co., March 1980.

Figure 5.4.1.2-3. Pipemobile.



Source: R. M. Parsons Co., March 1980.

Figure 5.4.1.2-4. Liftmobile.

precast segment also dictates the use of a special transport vehicle. Figure 5.4.1.2-5 is a drawing of what a tractor-powered transport vehicle might look like.

Once the precast segments have been unloaded at the shelter site, the next job is to place them in the trench. The piece of special equipment required to perform this is an installing jumbo. Figure 5.4.1.2-6 is a drawing representing what this machine would look like.

After the segments are in place the final items of work on the concrete shelter itself include grouting the segments together, welding together the steel liners inside each shelter segment, installing the egress beams and rails, completing the headwall, and installing the closure. Some of these work items could be performed with special machines or equipment.

Backfilling (5.4.1.3)

One of the final construction items is the backfilling of the shelter trench. Figure 5.4.1.3-1 is a representation of the backfilling operation. While the backfill is being placed, it must also be compacted. Equipment, such as scrapers, bulldozers, and motor graders would be used in backfilling. Compaction equipment, such as the padfoot compactor shown in Figure 5.4.1.3-2, would also be required.

MECHANIZED CAST-IN-PLACE METHOD (5.4.2)

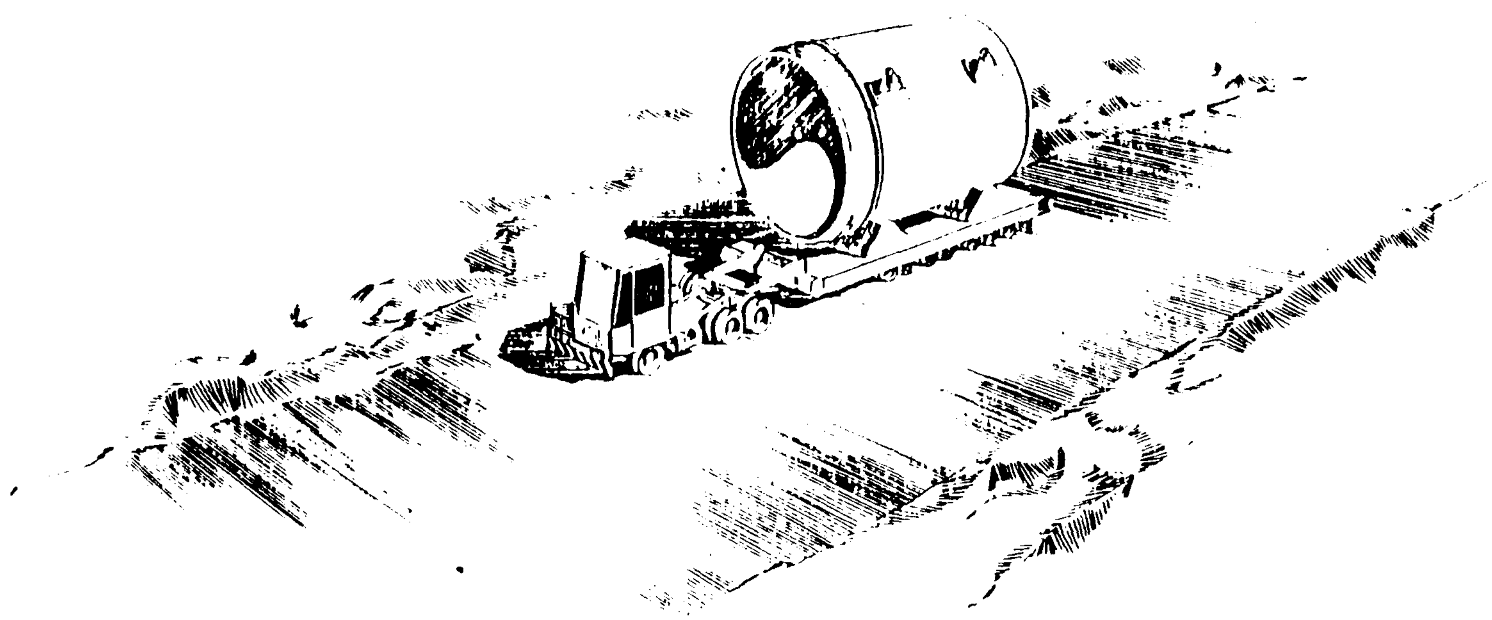
Mechanized cast-in-place construction is a method whereby the protective shelter is completely formed and poured at each of the shelter sites. The concrete plants required to support the cast-in-place method are more numerous than the precast method. This is because the concrete is hauled by batch trucks to the site and there is a maximum time limit for placing the concrete once it has been mixed. This time limit can be translated into a mileage, or distance requirement, which sets the number of concrete plants needed for a particular deployment alternative. It is estimated that between 100 and 200 concrete plants will be used for the mechanized cast-in-place method. Construction camps are not located at every concrete plant, but are situated basically the same as in the precast method. The concrete plants are still near aggregate sources and water wells; however, the construction camp area is the primary location for storing cement, steel, fly ash, and other materials required for construction. Figure 5.4.2-1 is a schematic drawing of a typical mechanized cast-in-place concrete plant.

The major work items for the mechanized cast-in-place method are excavating the trench and the ramp, forming and pouring the concrete shelter, and backfilling the site. As is the case with the precast method, it is anticipated that specialized equipment will be used.

Excavation (5.4.2.1)

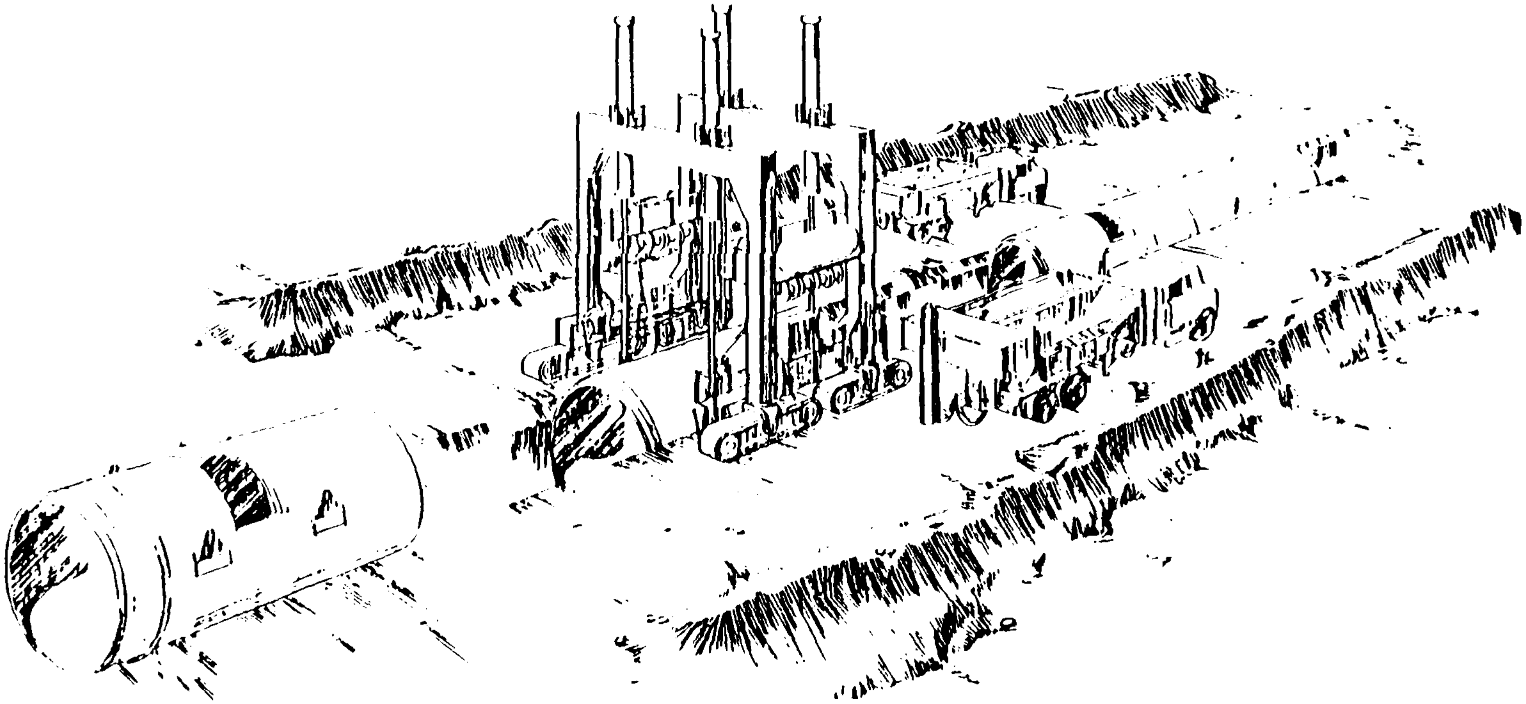
Excavating the trench and the ramp for the mechanized cast-in-place method is similar to that for the precast method. All of the ramp is excavated by open cut. The shelter trench is excavated to the springline of concrete shelter by open cut with the remainder accomplished by contour excavation.

Open cut excavation uses the same special machine as in the precast method (see Figure 5.4.1.1-1). Other equipment is available to perform this type of



SOURCE: R. M. PARSONS CO., JUNE 1980 1846-A-2

Figure 5.4.1.2-5. Tractor-trailer transporter.



SOURCE: R. M. PARSONS CO., JUNE 1980

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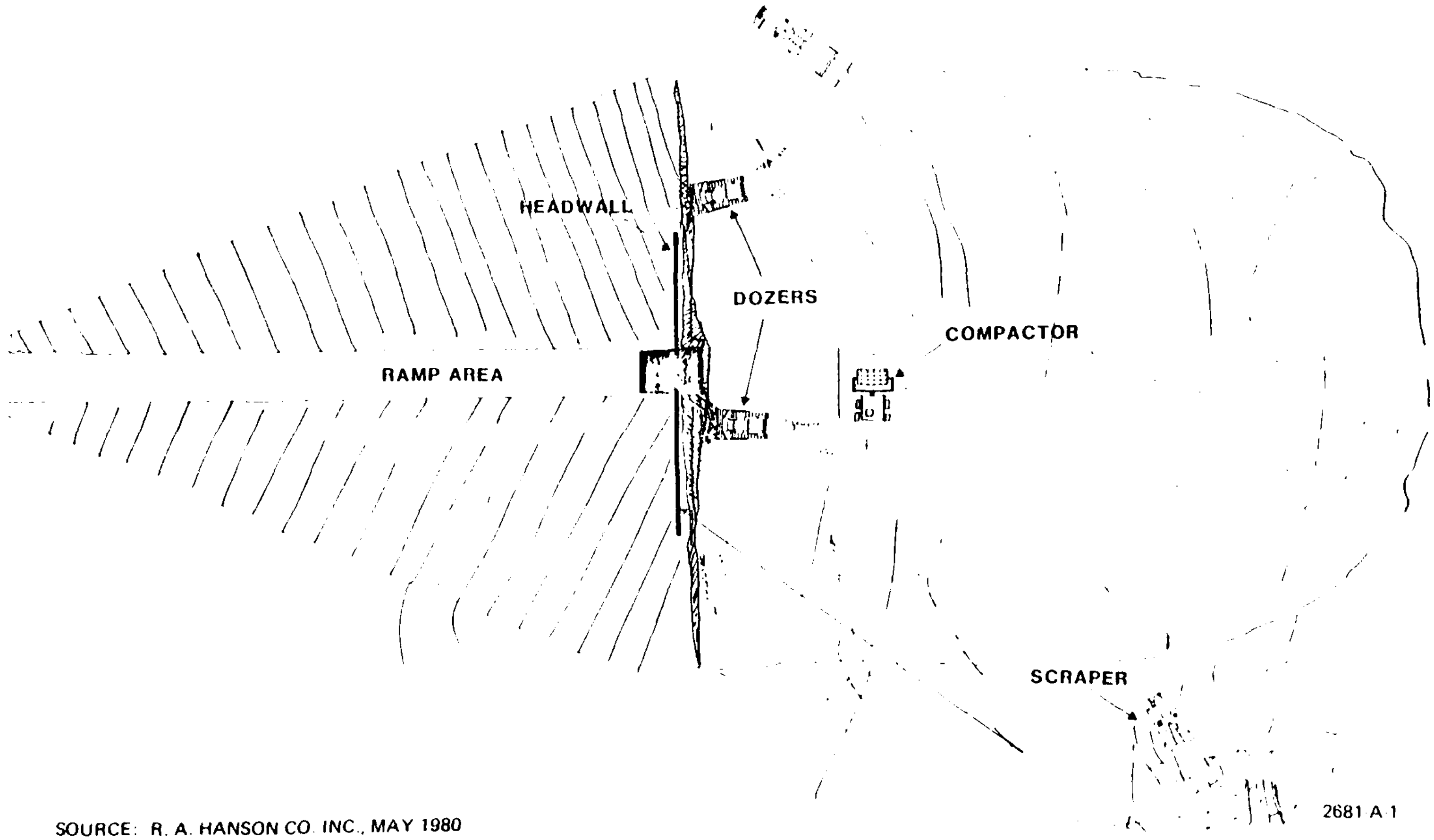
Figure 5.4.1.2-6. Installing jumbo.



SOURCE: R. A. HANSON CO. INC., MAY 1980

Figure 5.4.1.3-1. Backfilling.

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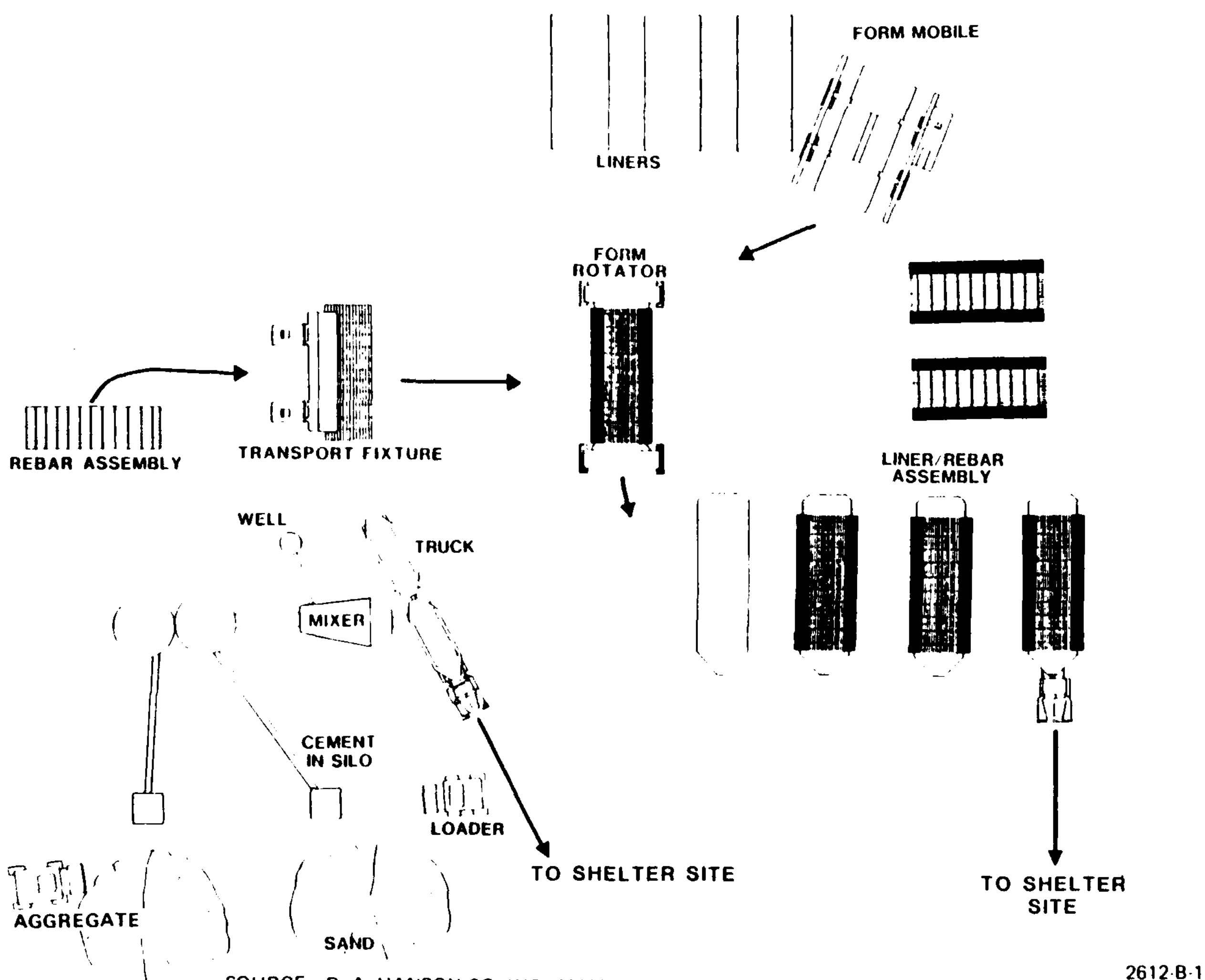
Figure 5.4.1.3-2. Padfoot compactor.



SOURCE: R. A. HANSON CO. INC., MAY 1980

Figure 5.4.2-1. Mechanized cast-in-place concrete plant.

excavation. This equipment, such as scrapers, bulldozers, and motor graders has the disadvantage of requiring a large area in which to operate.

The contour excavation of the remainder of the shelter trench is performed in the same manner as the precast construction. Figue 5.4.2.1-1 is a more detailed drawing of the contour excavating machine illustrated in Figure 5.4.1.1-3. The semicircular trench is the outside form for the bottom half of the concrete shelter.

Cast-In-Place Shelter (5.4.2.2)

In the mechanized cast-in-place method, reinforcing steel and steel liners are fabricated and delivered to the concrete plant where they are assembled in segments approximately 45 ft long. The steel liner/rebar assemblies are transported to the shelter site, placed in the contoured trench, and welded together, thus becoming the inside form of the concrete shelter. Then the special slipform machine is positioned over the trench, the concrete is trucked in from the concrete plant, and the shelter is poured. The concrete is vibrated in the forms to evenly distribute it around the reinforcing and eliminate any voids. The forms are removed much earlier than in the precast method, since the shelter is already in place and has only to withstand its own weight.

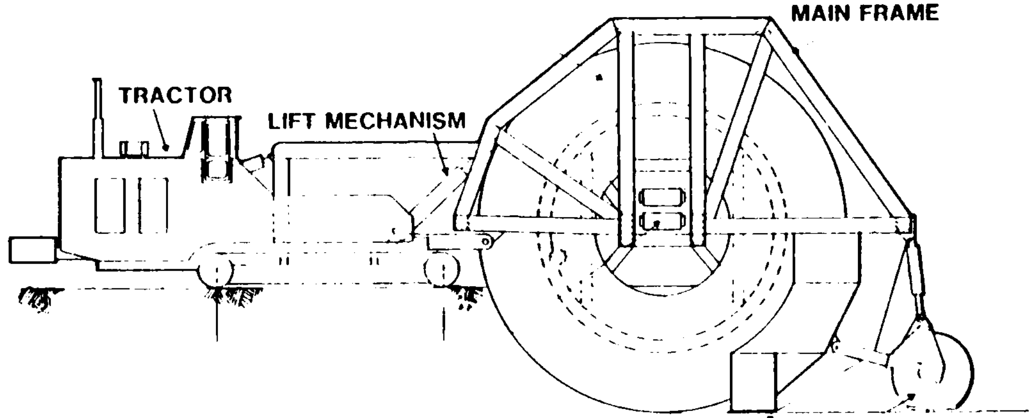
As with the precast operation, special equipment is required for the mechanized cast-in-place method.

The same special equipment used in making the reinforcing steel/steel liner cages in the precast method (see Figures 5.4.1.2-1 and 5.4.1.2-2) can be used in the mechanized cast-in-place method. The steel liner/rebar assemblies, or segments, must be hauled from the concrete plant to the shelter site. Figure 5.4.2.2-1 illustrates a type of transport vehicle that could be used.

The pouring of the concrete shelter involves several types of special equipment. Figure 5.4.2.2-2 is a schematic drawing of a shelter site showing the machinery required in pouring the concrete. Some of the special equipment illustrated in this drawing are the slipform assembly, the form vibrator, and the truck unloader. The purpose of the slipform assembly is to move along the shelter trench providing the top, outside form as the concrete is poured. The slipform assembly is shown in more detail in Figure 5.4.2.2-3. The form vibrator moves along with the slipform assembly, vibrating the forms and the concrete. Figure 5.4.2.2-4 is a detailed drawing of a type of form vibrator. The truck unloader moves alongside the shelter trench. The concrete batch trucks drive onto the truck unloader and dump the concrete into the hopper. From the hopper the concrete is then distributed into the forms by a conveyor. Figure 5.4.2.2-5 is a drawing of a type of truck unloader that could be used.

Backfilling (5.4.2.3)

The backfilling of the shelter trench can be accomplished in the same manner as in the precast method. Refer to Figures 5.4.1.3-1 and 5.4.1.3-2 for details of the backfilling operation and the padfoot compactor.



SOURCE: R. A. HANSON CO. INC., MAY 1980

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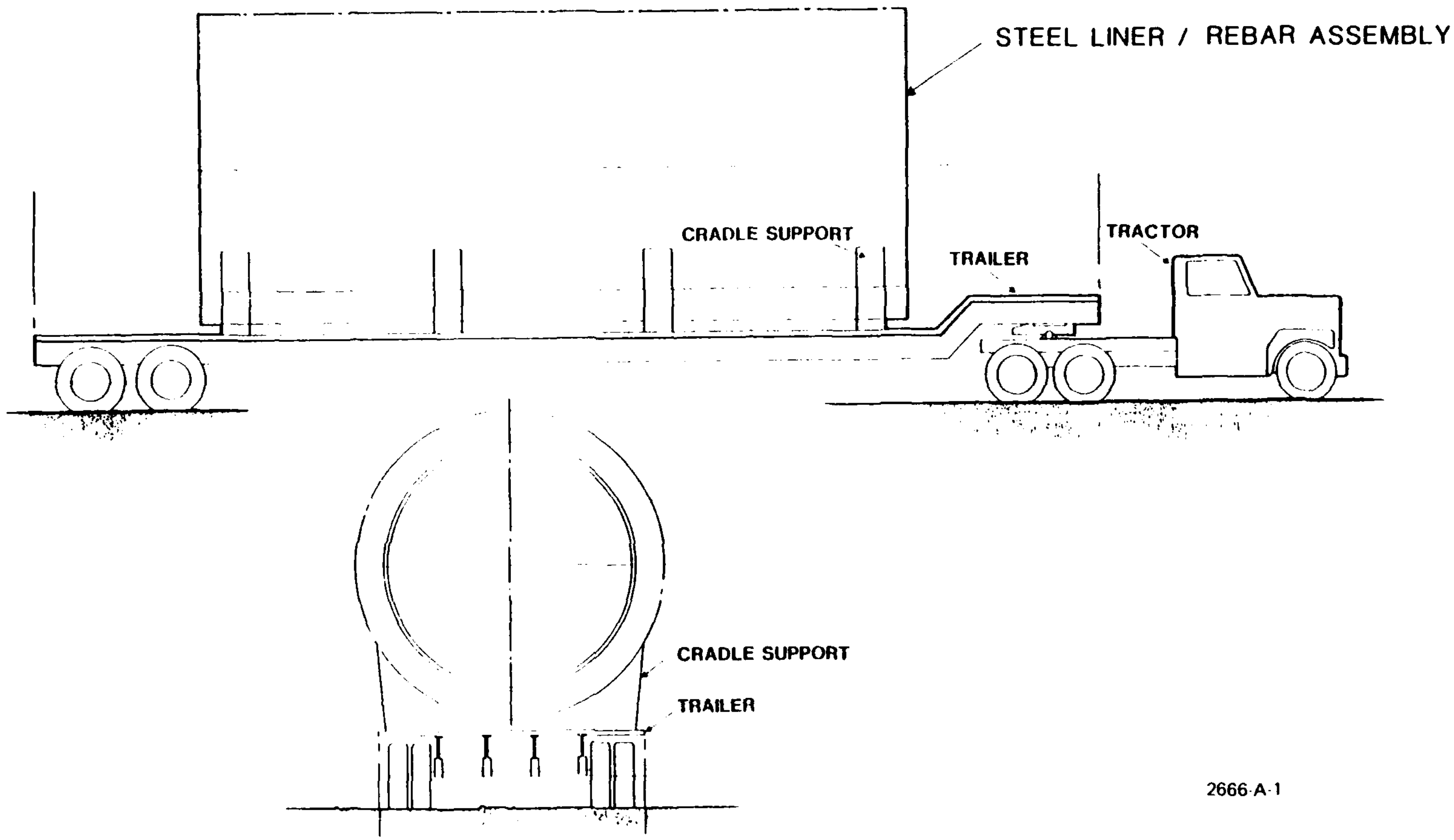
Figure 5.4.2.1-1. Contour excavating machine.



SOURCE: R. A. HANSON CO. INC., MAY 1980

Figure 5.4.2.2-1. Steel liner/rebar transport trailer assembly.

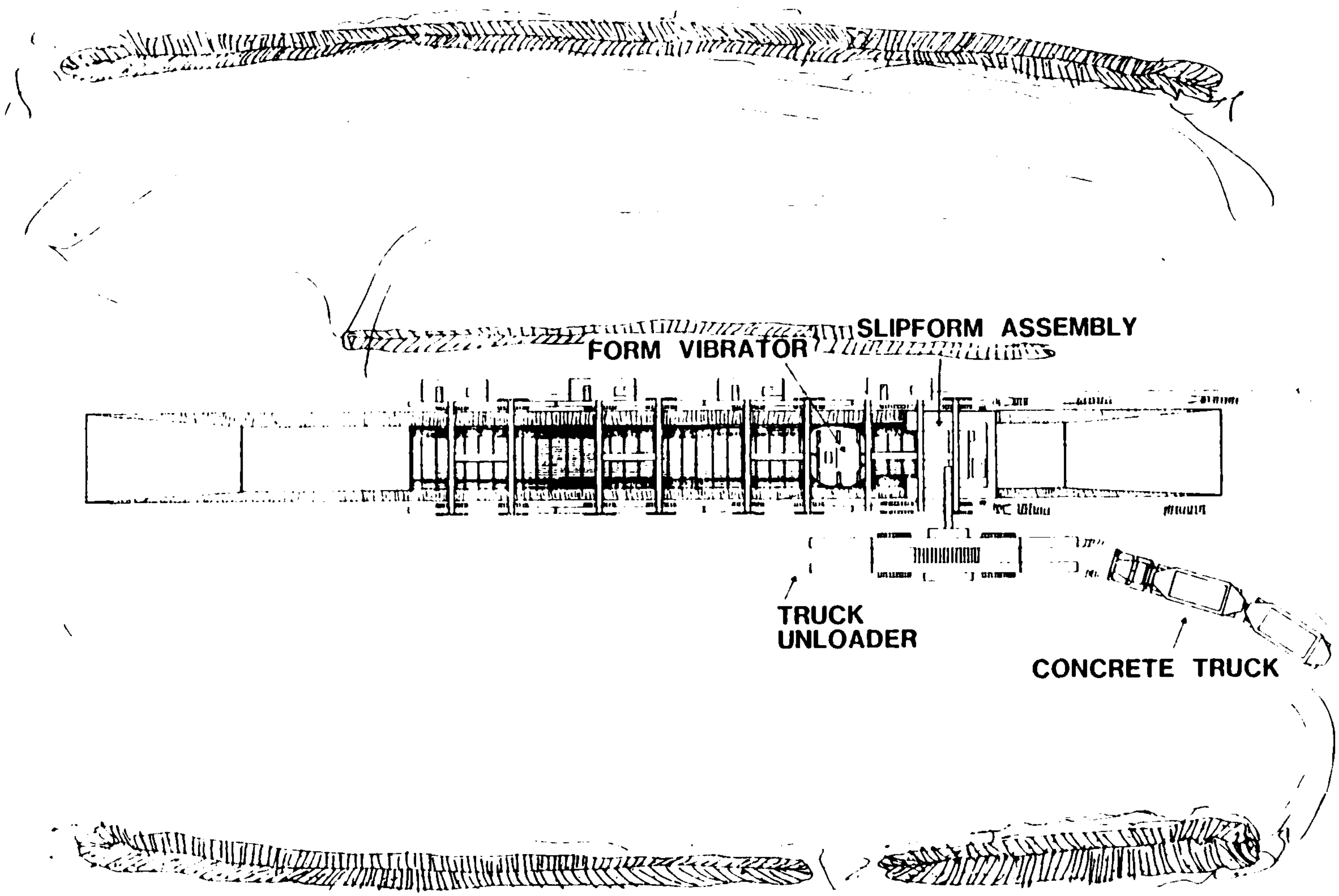


Figure 5.4.2.2-2. Pouring protective shelter.

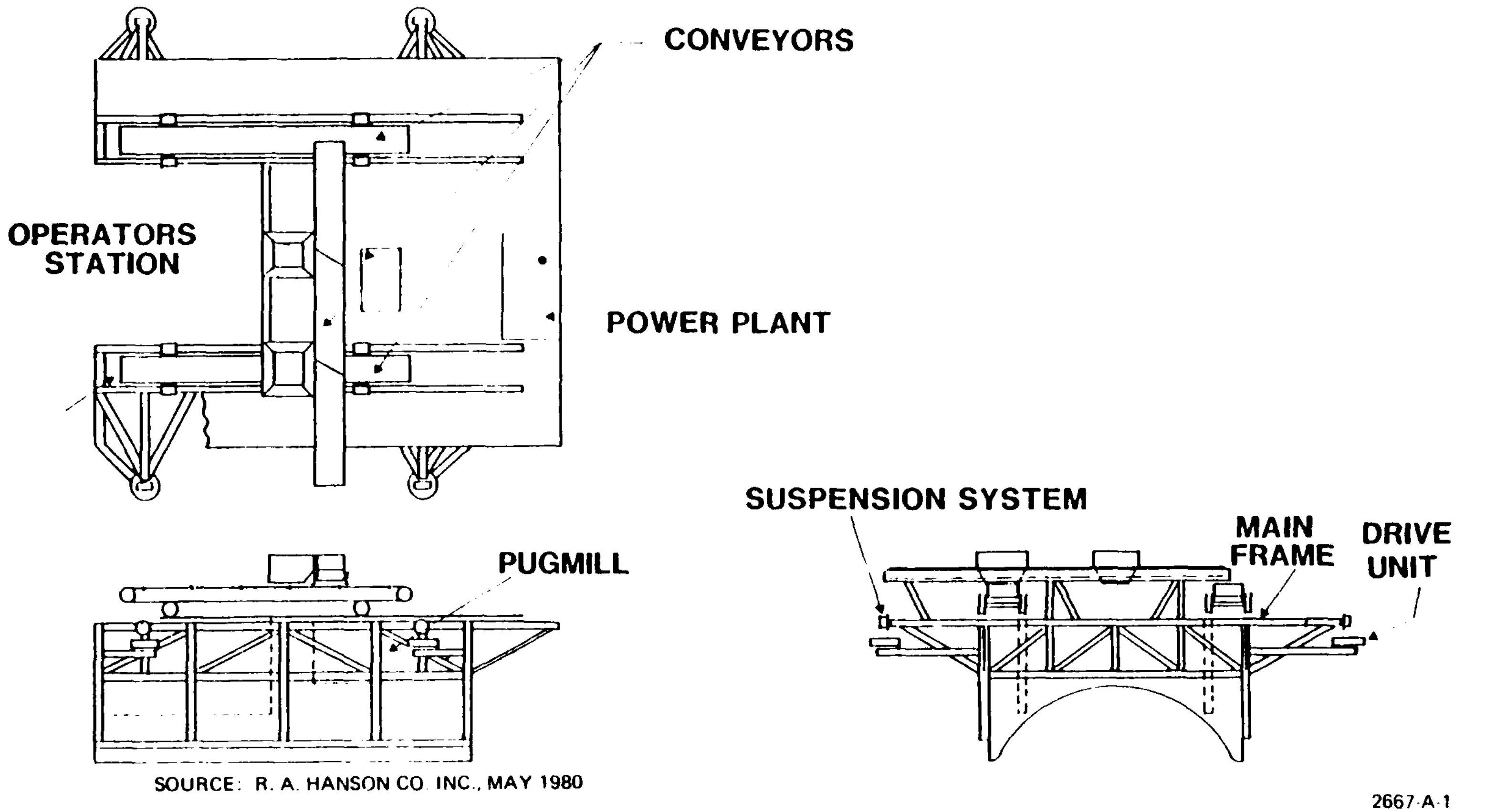
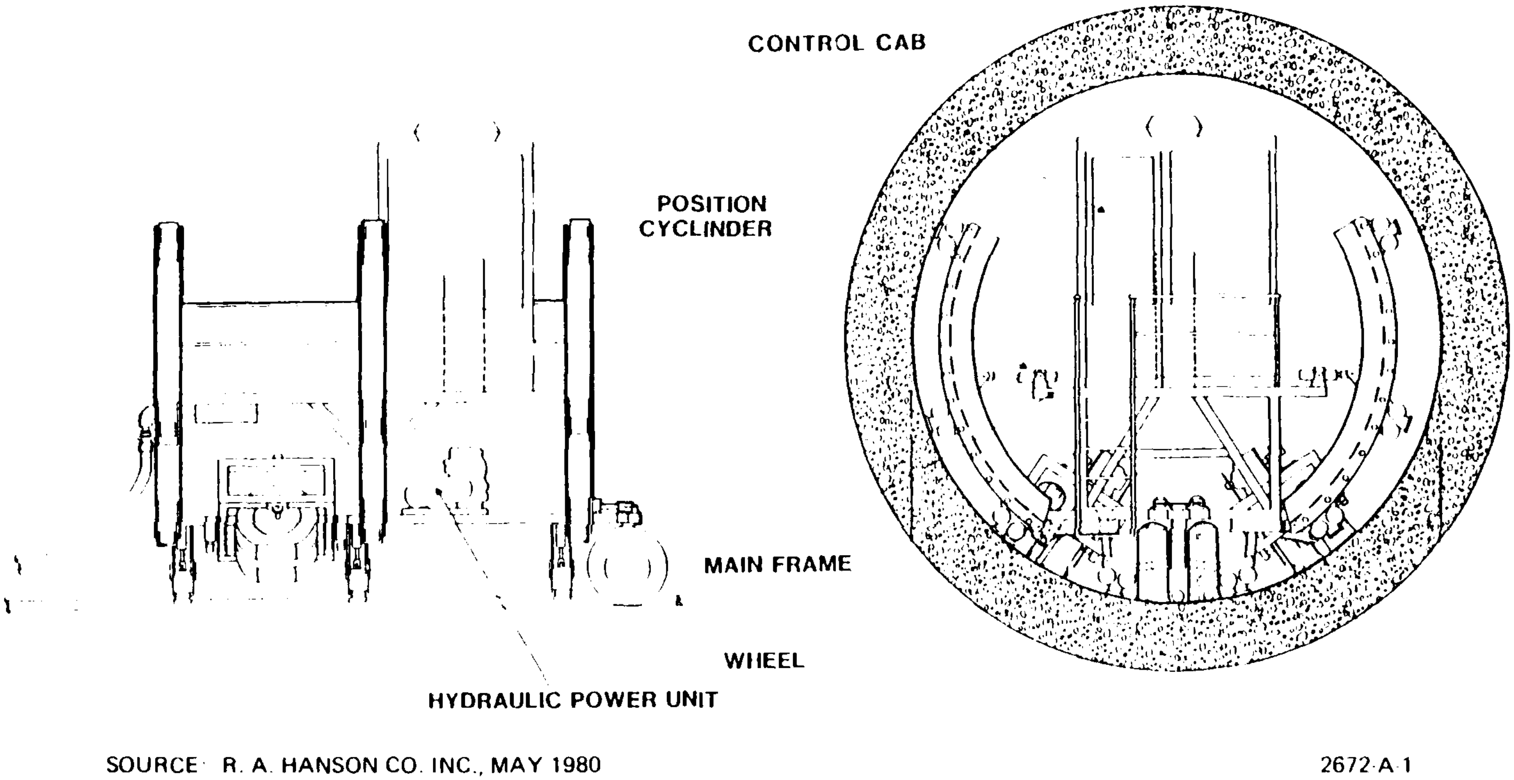


Figure 5.4.2.2-3. Slipform assembly.



SOURCE: R. A. HANSON CO. INC., MAY 1980

Figure 5.4.2.2-4. Form vibrator.

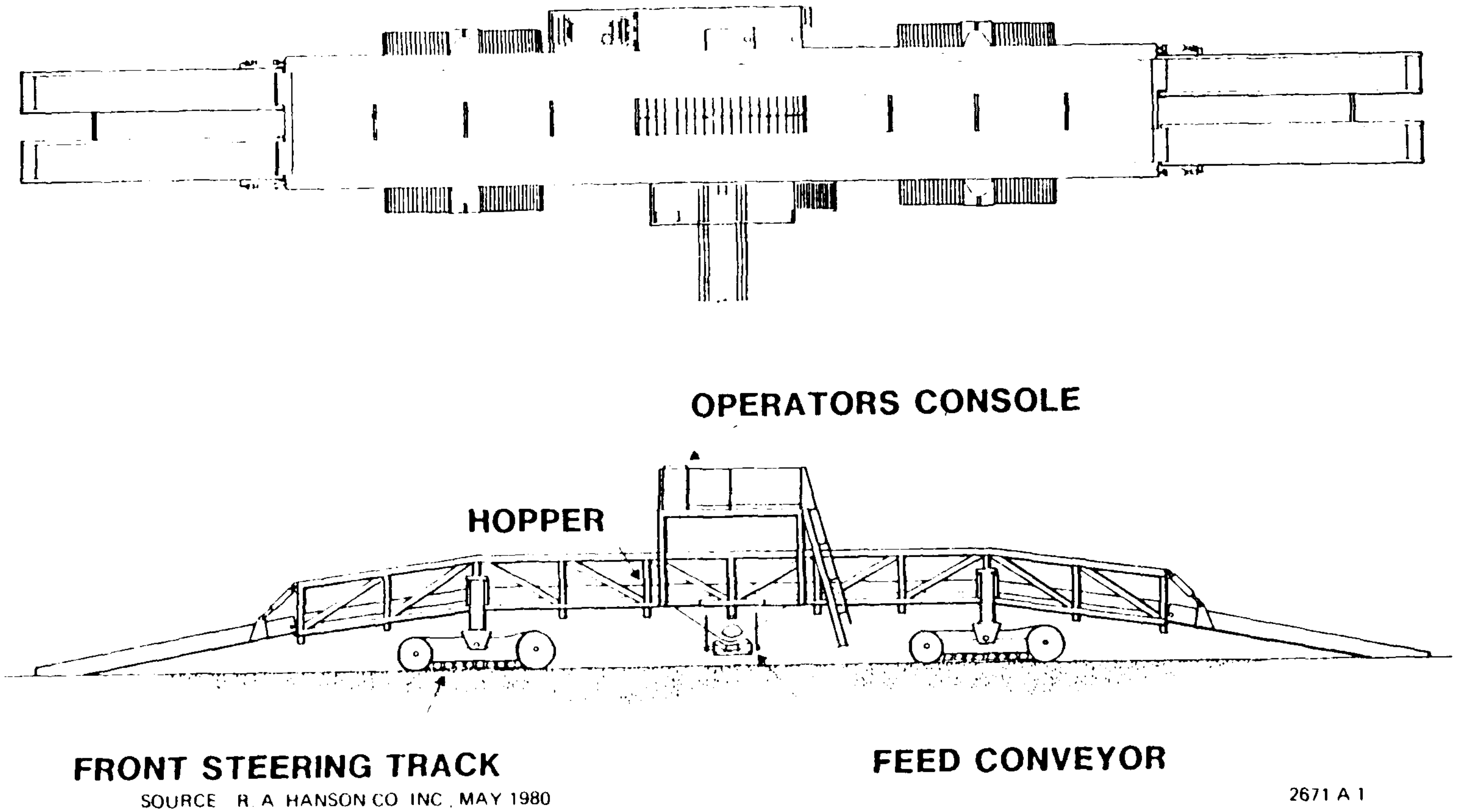


Figure 5.4.2.2-5. Truck unloader.

CONVENTIONAL CAST-IN-PLACE METHOD (5.4.3)

Conventional cast-in-place construction is a method in which the protective shelter is completely formed and poured at each of the shelter sites. In that regard it is the same as the mechanized cast-in-place method. Except for the use of fixed forms instead of slipforms, the conventional cast-in-place method could be almost identical with the mechanized cast-in-place. However, for the purposes of this report, it is assumed that the conventional cast-in-place method uses no special equipment unless it is absolutely required. The number and location of the concrete plants are the same as for the mechanized cast-in-place method. Figure 5.4.3-1 is a schematic drawing of a typical concrete plant for the conventional cast-in-place construction method. As in the case of the mechanized cast-in-place method, the major items of work for the conventional cast-in-place method are excavating the shelter trench and the ramp, forming and pouring the concrete shelter, and backfilling the site.

Excavation (5.4.3.1)

Excavating the shelter trench and the ramp for the conventional cast-in-place method is done by established techniques used in most highway construction. Scrapers and bulldozers are the most common types of equipment used. Figure 5.4.3.1-1 illustrates how the excavation is accomplished at a shelter site. A trapezoidal shaped section is excavated, similar to that for the precast method. The excavated material is carried by the scraper to an area adjacent to the trench, but far enough away to allow for construction of the shelter. The bulldozer is used for finer excavation. When the trench or ramp excavation gets close to the final elevation, the motor grader is used in place of the scraper. Bulldozers are also used to excavate the side slopes and sometimes they are required to push the scrapers.

Cast-in-Place Shelter (5.4.3.2)

As in the mechanized cast-in-place method, the reinforcing steel and the steel liners are fabricated and delivered to the concrete plant site. The reinforcing steel and steel liners are then assembled in segments about 45 ft long and transported to the shelter site. Forms are set in the trench and the steel liner/rebar assemblies are then placed and become the inside forms of the concrete shelter. The concrete is trucked in from the concrete plant and is pumped into the forms. The concrete and the forms are vibrated for the duration of the pour to ensure that the concrete is evenly distributed and to eliminate voids. The forms are removed after the concrete has gained enough strength to support its own weight.

A minimum amount of special equipment is assumed to be used in the forming and pouring of the concrete shelter. The special equipment used to fabricate the reinforcing steel and steel liners for the precast and the mechanized cast-in-place methods is also applicable for the conventional cast-in-place method (see Figures 5.4.1.2-1 and 5.4.1.2-2). Since these assemblies are not fabricated at the shelter site, a transport vehicle, such as the one illustrated in Figure 5.4.2.2-1 for the mechanized cast-in-place method, is used.

The setting of the forms is done by conventional methods using cranes to place the forms in the trench. The concrete is pumped from batch trucks into the forms by conventional concrete pumps. Removing the forms is also done with cranes.

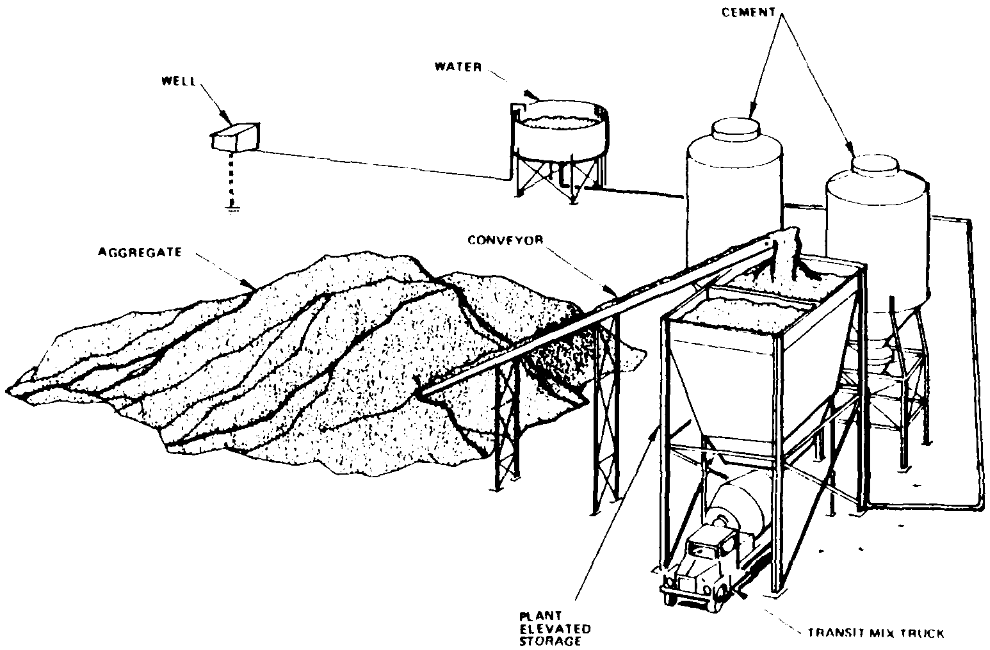
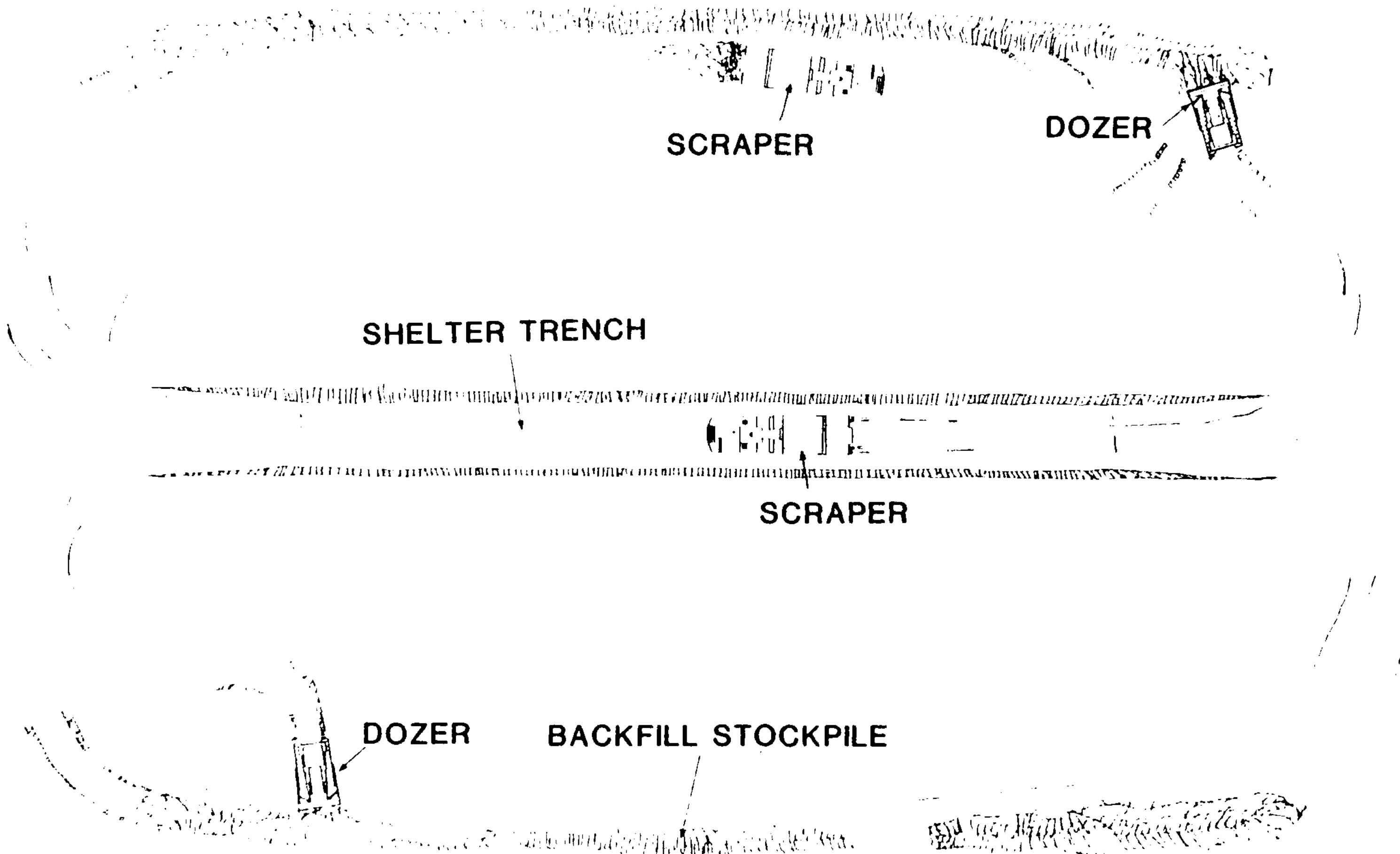


Figure 5.4.3-1. Conventional cast-in-place concrete plant.



SOURCE R. A HANSON CO INC., MAY 1980

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Figure 5.4.3.1-1. Conventional excavation.

Backfilling (5.4.3.3)

Backfilling the shelter trench is done in the same manner as in the precast method. See subsection 5.4.1.3 for this discussion.

5.5 ASSEMBLY AND CHECKOUT (A&CO)

The A&CO effort encompasses not only the clusters and their associated missiles, vehicles, and facilities in the DDA, but also all the technical and contractor support facilities and subsystems at the OB complexes. The purpose of A&CO is to install all components and subsystems of the M-X weapons system and to assure that the system operates properly.

The A&CO function begins with the acceptance of facilities from the construction contractor and receipt of weapon system components/subsystems from the manufacturer, and continues through final acceptance by the using command. A&CO operations begin at the time that facilities are available, and generally include receipt and inspection of system components, acceptance of facilities and equipment already installed, installation of components/subsystems, checkout and integration of subsystems, system integration, demonstration of acceptable operation, turnover to the user, and preparation for operational use.

A&CO activities are conducted both by contractor personnel and by the Air Force military and civilian personnel. Their activities begin with site preparation, and continue through the time that the last operational missiles are turned over and accepted by the Strategic Air Command.

Since A&CO will follow construction, no special facilities for personnel support are expected to be required since existing construction camp facilities can be used.

5.6 DEMOBILIZATION

At the close of construction, personnel and equipment will be moved out. Temporary water wells used during construction will be capped and locations permanently marked. Aggregate pits and mines will be closed. Haul roads, campsites, and maintenance yard sites will be returned to their original state to the extent possible. Permanent facilities will be turned over to operational personnel. It should be noted that this demobilization phase will overlap, in part, the A&CO phase, until final demobilization.

6.0 IMPACTS AND MITIGATIONS

6.1 IMPACTS

The impacts of the construction of the M-X system affect people, land, and materials. These impacts are discussed as they relate to construction resources. The impacts on people are examined in terms of the numbers and locations of construction personnel required to build the system. Land impacts are examined in terms of the areas disturbed by the construction operations. The impacts on materials are examined as they relate to the demands for construction resources, such as cement.

Large numbers of construction personnel are required at onsite locations over an eight-year period. Specific requirements for each of the alternatives are given in Appendices A through E of this ETR. As currently proposed, each person will work a standard 40-hour week (five eight-hour days).

The areas disturbed by construction for each of the alternatives are also given in Appendices A through E. Related to the disturbances are the types of facilities to be built and construction methods or procedures used. As an example, construction of the protective shelter could be accomplished by any one of three different methods, as discussed in subsection 5.4 of this ETR.

The demands for construction resources for each of the alternatives are given in Appendices A through E and in subsection 1.2 of this ETR. The peak year demand for each resource would result in the primary impact. This demand impacts the availability and cost of the resource for non-M-X construction.

6.2 MITIGATIONS

The Air Force will reduce the number of onsite construction personnel. This mitigation measure involves the use of offsite construction techniques, such as possibly utilizing prefabricated building units for the OBs or ASCs.

The Air Force will design facilities and establish construction procedures to minimize the disturbed areas. They will consider the design of permanent facilities to also satisfy temporary needs. For example, some of the facilities at an ASC could be used for a construction camp, if they were designed and contructed early. They will strictly enforce the contractors' use of available areas.

The Air Force will diversify cement sources and purchase points to the extent permitted by Defense Acquisition Regulations. This should help to reduce possible shortages or cost increases for non-M-X construction. They will also utilize alternative construction methods and procedures to minimize impacts on scarce resources. One of these alternative methods might be the use of a dust palliative that does not require water. The Air Force will provide centralized procurement of materials and equipment to minimize adverse economic impacts, where feasible. This might include such materials as cement and steel.

There are additional mitigation measures that could also be implemented to reduce impacts. One possible method of mitigating numbers of construction

personnel is the use of longer work periods during peak construction, such as a ten-hour day and/or a six-day week for short durations. There are several measures that might be applied to various construction resources. The water required to wash aggregate may be reduced if the quarried rock is of a high quality (low quantity of deleterious material). The application of the mitigation will not be known until the site-specific geotechnical data are available. Using covered trucks to haul the aggregate to the construction sites would reduce evaporation losses, thereby saving some of the water needed for compaction of the aggregate base and surface courses for the roads. Water required for earth compaction could be diminished if silty soils were used in embankments, instead of clayey soils, since these generally require a lower optimum moisture content for compaction. Aggregate requirements could be reduced if the designs of the roads were revised to use less aggregate.

APPENDIX A PROPOSED ACTION

A.1 DESCRIPTION

The Proposed Action calls for full deployment in the southern and east-central parts of the Nevada/Utah region, with the first OB complex located near Coyote Spring Valley, Nevada, and a second OB complex near Milford, Utah.

A.2 CONSTRUCTION SCENARIO

The construction plan used in the analysis of full deployment in Nevada/Utah (Proposed Action) is shown in Figure A.2-1. Six to eight concrete plants would be required in a total of 20 different locations. Colocated with these plants would be construction camps and marshalling yards/staging areas. The exact locations for these plants will be determined based primarily on the following criteria: water availability, aggregate availability, and minimum haul distances.

OB COMPLEX CONSTRUCTION (A.2.1)

A construction camp will be established at each of the two OB complexes. The major work item originating from these two camps is building construction.

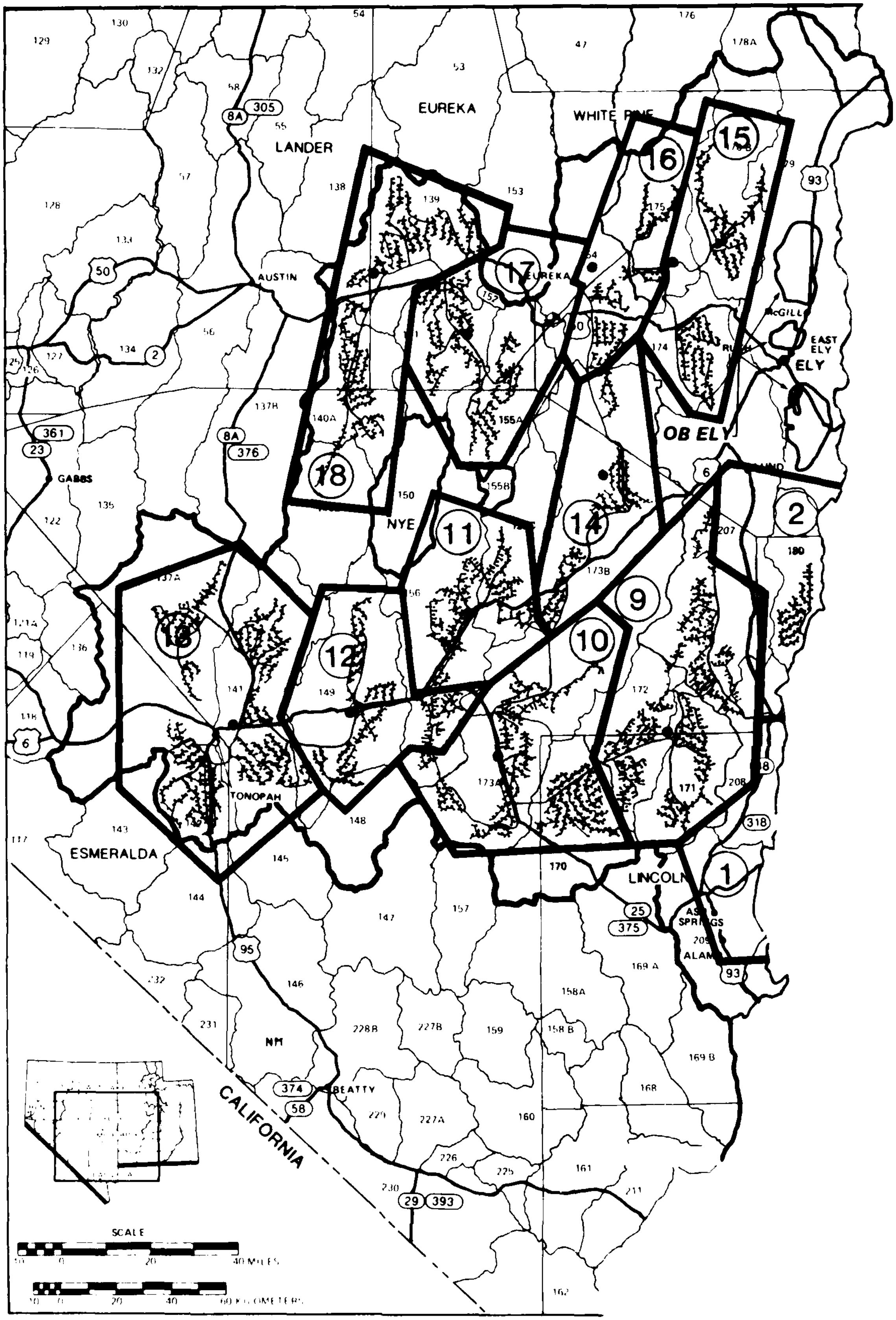
When the scheduling for the OB complexes was established, it was intended that construction would begin at the first OB complex in 1982 and would be complete in 1987. Construction of the second OB complex would begin in 1984 and end in 1988. There are studies in progress which may change this preliminary scheduling.

For the Proposed Action, the first OB complex is near Coyote Spring Valley. Most of the construction in the first year will be concentrated in the DAA, OBTS, and at the airfield. A portion of the DTN connecting the DAA to the DDA will also be constructed from the camp in the OB complex. Construction in the DAA, OBTS, and at the airfield should be completed in 1984, with the rest of the construction years devoted to the OB. Figure A.2.1-1 shows the construction schedule for the first OB complex.

The second OB complex for the Proposed Action is near Milford. Since this complex does not have to be operational for IOC, construction will not be as accelerated as the first OB. All construction activity will be at the OB and airfield, since there is no DAA or OBTS associated with the second OB complex. Figure A.2.1-2 shows the construction schedule for the second OB complex.

DDA CONSTRUCTION (A.2.2)

The key construction items originating from the DDA plants are DTN, cluster roads, and protective shelters. The range of DTN mileage constructed from any one plant is from about 45 to 110 mi. Between approximately 180 and 590 mi of cluster roads can be constructed from a plant. The number of protective shelters built from a plant ranges from about 140 to 440. Of the 6,200 mi of cluster roads required for the Proposed Action, approximately 4,960 mi will have a 10-in. surface thickness and the remaining 1,240 mi will have a 19-in. surface thickness (see subsection 3.2.2 of this ETR for more information).



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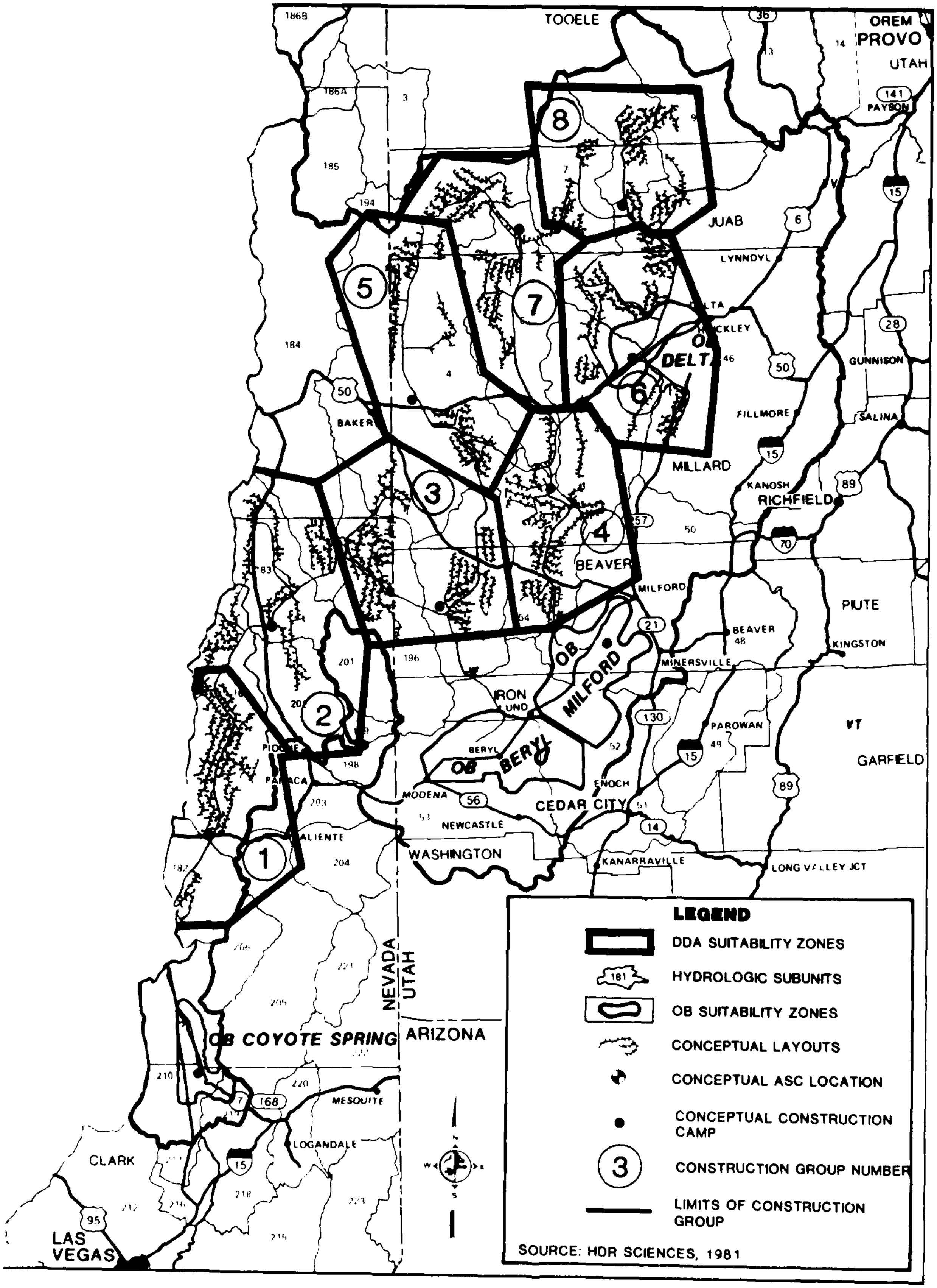

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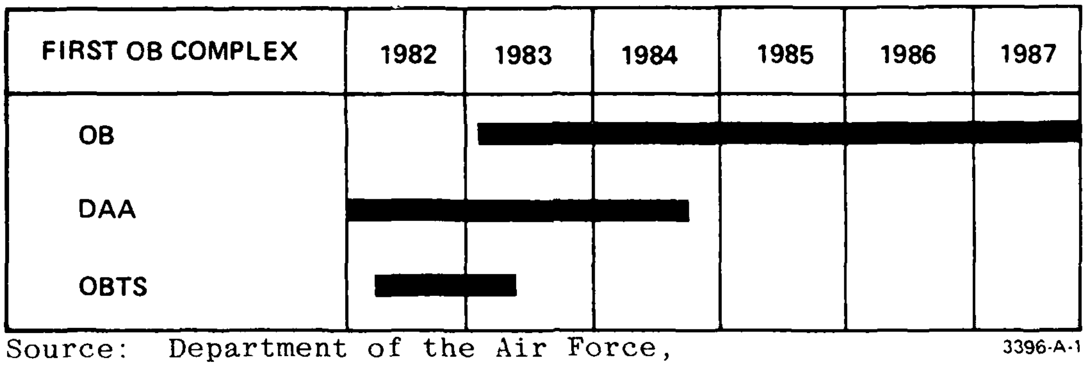
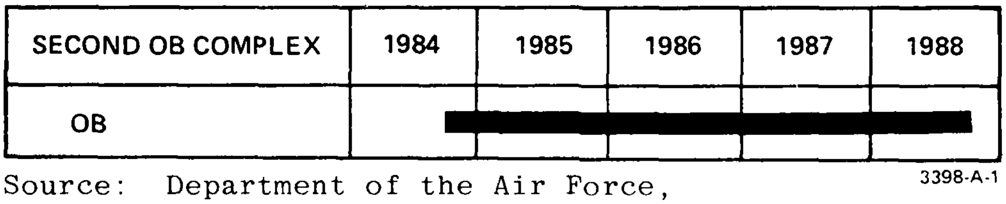
Figure A.2-1. System layout with construction plan for the Proposed Action and Alternatives 1-6, full deployment, Nevada/Utah.



Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Figure A.2.1-1. First OB complex construction schedule for Proposed Action and Alternatives 1-8.



Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Figure A.2.1-2. Second OB complex construction schedule for Proposed Action and Alternatives 1-7, full deployment, Nevada/Utah or Texas/New Mexico.

Eighteen construction groups were established for scheduling purposes. Each group contains from 6 to 19 clusters. The construction operations will be pursued in accordance with the schedule shown in Figure A.2.2-1. Work would begin at Coyote Spring Valley, where the first OB complex construction terminates, proceed north to Dry Lake and Delamar valleys, and then branch out to progress through Nevada and Utah. Construction will peak in 1986. Schedule changes for specific construction groups for the Proposed Action could be made.

A.3 CONSTRUCTION RESOURCE REQUIREMENTS

Table A.3-1 shows the average direct personnel required for any given year. This table includes construction, A&CO, and operations personnel. The peak year for onsite construction personnel occurs in 1986 with approximately 18,500 required. Onsite A&CO personnel requirements peak over a three-year span, 1987-1989, with approximately 5,600 people needed in each of the years. The peak for operations personnel will occur at final operational capability (FOC) in 1989, and remain constant thereafter. This number will be approximately 13,300. Tables A.3-2, A.3-3, and A.3-4 give a more detailed breakdown of construction, A&CO, and operations personnel requirements, respectively.

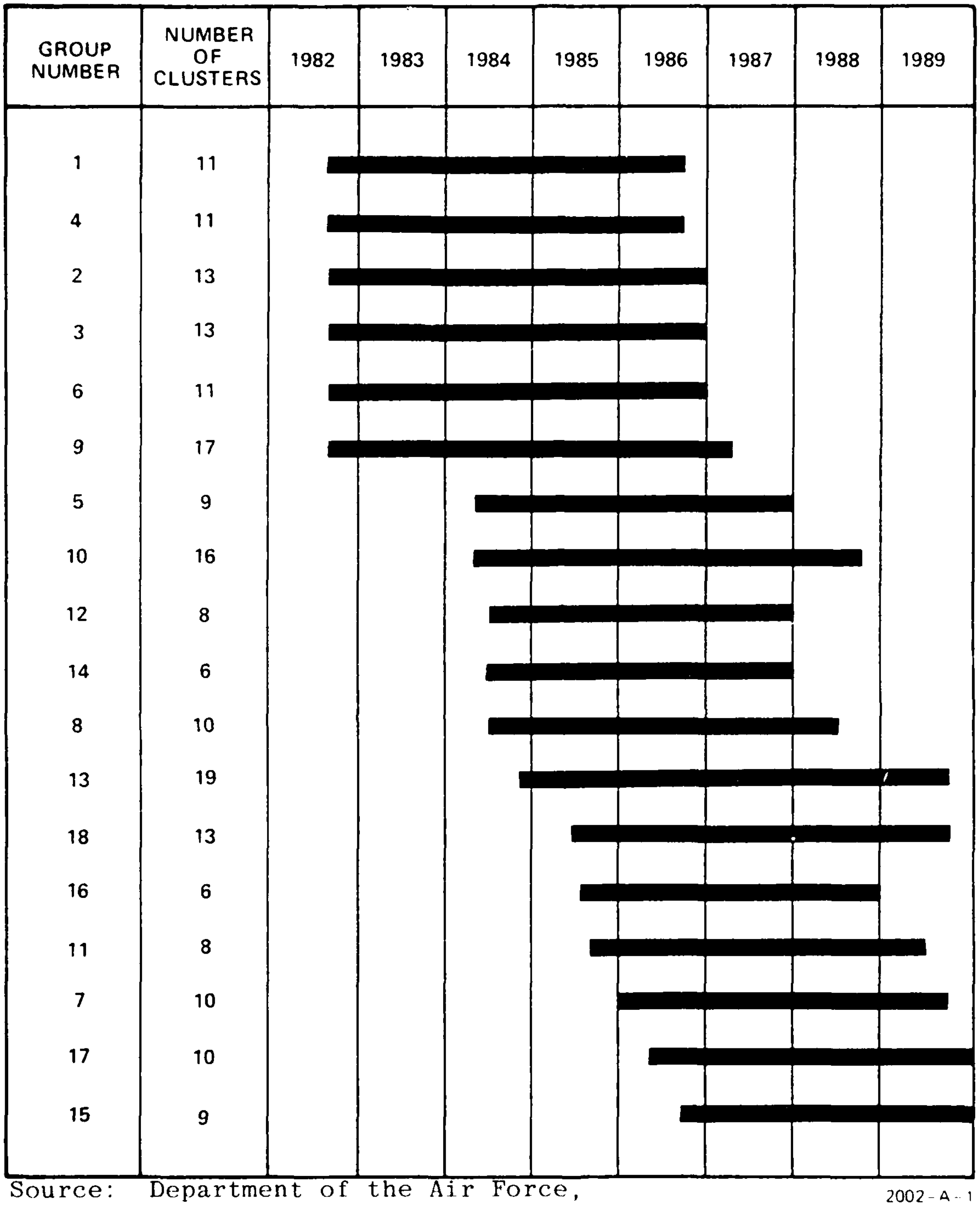
The total construction resources for the Proposed Action are shown in Table A.3-5. Incremental and cumulative quantities are shown for each resource. Water quantities include both domestic and construction uses. The disturbed area includes permanent facilities only. The areas associated with temporary construction facilities, such as marshalling yards, water wells, and aggregate pits, are given in Section 1 of this ETR. Steel quantities include shelter and building construction, as do the concrete quantities. Asphalt and prime coat quantities are for DTN construction. Quantities for aggregate include only road construction. Section 1 and Table 1.2-5 of this ETR give the total range of aggregate required. Fencing includes all fenced operations areas.

OB COMPLEXES (A.3.1)

Table A.3.1-1 shows the total construction resources for both OB complexes. The peak year for the construction resources is 1985. Most of the resources are associated with building construction. The rest are attributable to shelter construction at the OBTS, road construction throughout the complexes, and airfield construction.

DDA (A.3.2)

The total resource requirements associated with construction of the DDA for the Proposed Action are shown in Table A.3.2-1. See the general discussion of the total construction resources at the beginning of subsection A.3. Except for building construction, the comments also apply to DDA construction.



Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Figure A.2.2-1. DDA construction schedule for Proposed Action and Alternatives 1, 2, 4, and 6, full deployment, Nevada/Utah.

Table A.3-1. Average direct personnel requirements for DDA and OB facilities for Proposed Action and Alternatives 1,2,4, and 6, full deployment, Nevada/Utah, 1981-1991.

Description	Personnel										
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Onsite/Location											
Construction											
DDA[1]		643	2,654	6,569	13,415	14,839	14,719	12,047	5,490		
OB Complexes[2,3]		1,392	2,936	2,941	4,495	3,721	2,951	718			
Subtotal		2,035	5,590	9,510	17,910	18,560	17,670	12,765	5,490		
A&CO											
DDA[1]		10	100	300	1,250	4,000	4,300	4,350	4,350	100	
OB Complexes[2,3]		50	200	500	900	1,250	1,300	1,250	1,250	250	
Subtotal		60	300	800	2,150	5,250	5,600	5,600	5,600	350	
Operations											
OB Complexes[2,3]			39	234	2,642	5,923	9,668	12,219	13,330	13,330	13,330
Total Onsite		2,095	5,929	10,544	22,702	29,733	32,938	30,584	24,420	13,680	13,330
Offsite/Location											
Construction											
Salt Lake City	77	208	347	410	410	410	410	300	100	100	
A&CO											
Las Vegas	30	250	500	600	300	200	200	200	200	100	
Total Offsite	107	458	847	1,010	710	610	610	500	300	200	
Grand Total	107	2,553	6,776	11,554	23,412	30,343	33,548	31,084	24,720	13,880	13,330

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[1]Designated deployment area (DDA) includes protective shelters (PS), area support centers (ASC), designated transportation network (DTN), cluster maintenance facilities (CMF), remote surveillance sites (RSS), and cluster roads (CR).

[2]First OB complex includes operating base (OB), designated assembly area (DAA), operational base test site (OBTS), and airfield.

[3]Second OB complex includes OB and airfield.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table A.3-2. Average direct construction personnel requirements for DDA and OB facilities for Proposed Action and Alternatives 1, 2, 4, and 6, full deployment, Nevada/[illegible], [illegible]

Group Number[1]	Construction Personnel									
	1981	1982	1983	1984	1985	1986	1987	1988	1989	[illegible]
Onsite/Location										
1		90	375	838	1,735	829				
2		107	442	924	1,814	1,238				
3		107	442	924	1,814	1,100				
4		90	375	838	1,735	829				
5				197	342	1,217	1,449			
6		107	442	832	1,692	932				
7						294	543	1,775	[illegible]	
8				160	386	988	1,804	270		
9		142	578	1,256	1,848	1,557	182			
10				363	701	1,613	1,890	749		
11					48	322	883	1,491	202	
12				123	308	935	1,717			
13				18	572	972	1,946	1,777	941	
14				96	230	914	1,182			
15						65	409	1,241	1,476	
16					51	257	862	1,395		
17						246	549	1,613	1,199	
18					139	531	1,303	1,736	678	
Subtotal DDA		643	2,654	6,569	13,415	14,839	14,719	12,047	5,490	
Onsite/Location										
First OB Complex[2]		1,392	2,936	2,762	2,618	1,565	1,052			
Second OB Complex[3]				179	1,877	2,156	1,899	718		
Subtotal OB		1,392	2,936	2,941	4,495	3,721	2,951	718		
Total Onsite		2,035	5,590	9,510	17,910	18,560	17,670	12,765	5,490	
Offsite/Location										
Salt Lake City	77	208	347	410	410	410	410	300	100	100
Grand Total	77	2,243	5,937	9,920	18,320	18,970	18,080	13,065	5,590	100

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[1]See Figures A.2-1 and A.2.2-1.
[2]See Figure A.2.1-1.
[3]See Figure A.2.1-2.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table A.3-3. Average A&CO personnel requirements for DDA and OB facilities for Proposed Action and Alternatives 1, 2, 4, and 6, full deployment, Nevada/Utah, 1981-1990.

Group Number[1]	A&CO Personnel									
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Onsite/Location										
1		10	100	150	1,000	600				
2				50	150	800	300			
3				25	25	800	325			
4				25		625	400			
5						25	50	575		
6				25	25	225	675			
7							25	75	900	
8						25	225	600		
9				25	25	700	800			
10					25	50	500	800		
11						25	25	225	400	
12						25	325	200		
13						25	25	600	850	25
14						25	525			
15							25	225	700	25
16						25	25	225	300	
17							25	325	600	25
18						25	25	500	600	25
Subtotal DDA		10	100	300	1,250	4,000	4,300	4,350	4,350	100
First OB Complex[2]		50	200	500	900	1,250	1,250	1,250	1,250	250
Second OB Complex[3]							50			
Subtotal OB		50	200	500	900	1,250	1,300	1,250	1,250	250
Total Onsite		60	300	800	2,150	5,250	5,600	5,600	5,600	350
Offsite/Location										
Las Vegas	30	250	500	600	300	200	200	200	200	100
Grand Total	30	310	800	1,400	2,450	5,450	5,800	5,800	5,800	450

T5399/9-25-81/F

[1] See Figures A.2-1 and A.2.2-1.
[2] See Figure A.2.1-1.
[3] See Figure A.2.1-2.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table A.3-4. Average operations personnel requirements for OB facilities for Proposed Action and Alternatives 1-7, full deployment, Nevada/Utah and Texas/New Mexico, 1983-1989.

Employment Type	Operations Personnel						
	1983	1984	1985	1986	1987	1988	1989
First OB Complex							
Officer	10	34	224	487	610	610	610
Enlisted	27	148	1,907	4,342	5,900	5,900	5,900
Civilian	2	52	480	848	1,212	1,212	1,220
Subtotal	39	234	2,611	5,677	7,722	7,722	7,730
Second OB Complex							
Officer			5	12	166	262	290
Enlisted			24	170	1,513	3,416	4,275
Civilian			2	64	267	819	1,035
Subtotal			31	246	1,946	4,497	5,600
Total	39	234	2,642	5,923	9,668	12,219	13,330

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Note: Operations employment will continue at 1989 levels throughout the operating life of the project.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

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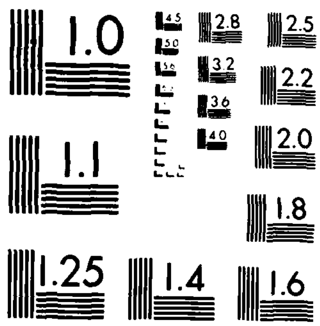

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Table A.3-5. Total construction resources for DDA and OB facilities for Proposed Action and Alternatives 1, 2, 4, and 6, full deployment, Nevada/Utah, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	1,898	15,424	31,357	29,167	35,610	28,446	15,044	5,781
Cumulative	1,898	17,322	48,679	77,846	113,456	141,902	156,946	162,727
Disturbed Area (acres)[2]								
Incremental	1,986	13,652	27,364	29,713	35,383	28,839	17,319	7,331
Cumulative	1,986	15,638	43,002	72,715	108,098	136,937	154,256	161,587
Steel (tons)								
Incremental	377	796	2,137	80,755	87,590	81,681	91,527	51,328
Cumulative	377	1,173	3,310	84,065	171,655	253,336	344,863	396,191
Concrete (cu yd*1,000)								
Incremental	78	166	176	837	846	760	710	376
Cumulative	78	244	420	1,257	2,103	2,863	3,573	3,949
Asphalt (tons*1,000)								
Incremental	503	2,229	1,351	1,734	1,568	532	44	
Cumulative	503	2,732	4,083	5,817	7,385	7,917	7,961	

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Table A.3-5. Total construction resources for DDA and OB facilities for Proposed Action and Alternatives 1, 2, 4, and 6, full deployment, Nevada/Utah, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	623	5,911	12,851	7,987	10,479	7,940	1,953	
Cumulative	623	6,534	19,385	27,372	37,851	45,791	47,744	
Prime Coat (tons)								
Incremental	2,269	9,057	5,850	7,731	6,885	2,859	384	
Cumulative	2,269	11,326	17,176	24,907	31,792	34,651	35,035	
Fencing (lin ft*1,000)								
Incremental	8	17	38	1,291	1,399	1,303	1,457	816
Cumulative	8	25	63	1,354	2,753	4,056	5,513	6,329

T3315/9-13-81/F

[1]Does not include A&CO or operations domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

Table A.3.1-1. Total OB complex construction resources for Proposed Action and Alternatives 1-6, full deployment, Nevada/Utah, 1982-1989.

Construction Resources	Quantity per Year						
	1982	1983	1984	1985	1986	1987	1988
Water (acre-ft)[1]							
Incremental	472	996	997	1,525	1,262	1,002	244
Cumulative	472	1,468	2,465	3,990	5,252	6,254	6,498
Disturbed Area (acres)[2]							
Incremental	914	1,928	1,932	2,952	2.444	1,938	472
Cumulative	914	2,842	4,774	7,726	10,170	12,108	12,580
Steel (tons)							
Incremental	377	796	797	1,218	1,008	800	195
Cumulative	377	1,173	1,970	3,188	4,196	4,996	5,191
Concrete (cu yd*1,000)							
Incremental	78	166	166	253	210	166	40
Cumulative	78	244	410	663	873	1,039	1,079
Asphalt (tons*1,000)							
Incremental	86	181	181	277	229	182	44
Cumulative	86	267	448	725	954	1,136	1,180
Aggregate (cu yd*1,000)							
Incremental	134	282	283	432	357	283	69
Cumulative	134	416	699	1,131	1,488	1,771	1,840
Prime Coat (tons)							
Incremental	745	1,571	1,574	2,405	1,991	1,579	384
Cumulative	745	2,316	3,890	6,295	8,286	9,865	10,249
Fencing (lin ft*1,000)							
Incremental	8	17	17	26	22	17	4
Cumulative	8	25	42	68	90	107	111

T3311/9-13-81/F

[1]Does not include A&CO or operations domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

Table A.3.2-1. Total DDA construction resources for Proposed Action and Alternatives 1, 2, 4, and 6, full deployment, Nevada/Utah, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	1,426	14,428	30,360	27,642	34,348	27,444	14,800	5,781
Cumulative	1,426	15,854	46,214	73,856	108,204	135,648	150,448	156,229
Disturbed Area (acres)[2]								
Incremental	1,072	11,724	25,432	26,761	32,939	26,901	16,847	7,331
Cumulative	1,072	12,796	38,228	64,989	97,928	124,829	141,676	149,007
Steel (tons)								
Incremental			1,340	79,537	86,582	80,881	91,332	51,328
Cumulative			1,340	80,877	167,459	248,340	339,672	391,000
Concrete (cu yd*1,000)								
Incremental			10	584	636	594	670	376
Cumulative			10	594	1,230	1,824	2,494	2,870
Asphalt (tons*1,000)								
Incremental	417	2,048	1,170	1,457	1,339	350		
Cumulative	417	2,465	3,635	5,092	6,431	6,781		

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Table A.3.2-1. Total DDA construction resources for Proposed Action and Alternatives 1, 2, 4, and 6, full deployment, Nevada/Utah, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	489	5,629	12,568	7,555	10,122	7,657	1,884	
Cumulative	489	6,118	18,686	26,241	36,363	44,020	45,904	
Prime Coat (tons)								
Incremental	1,524	7,486	4,276	5,326	4,894	1,280		
Cumulative	1,524	9,010	13,286	18,612	23,506	24,786		
Fencing (lin ft*1,000)								
Incremental			21	1,265	1,377	1,286	1,453	.816
Cumulative			21	1,286	2,663	3,949	5,402	6.218
Protective Shelters								
Incremental			16	935	1,019	952	1,074	604
Cumulative			16	951	1,970	2,922	3,996	4,600
Mi of DTN								
Incremental	90	440	252	313	288	75		
Cumulative	90	530	782	1,095	1,383	1,458		
Mi of Cluster Roads								
Incremental		527	1,829	955	1,397	1,184	308	
Cumulative		527	2,356	3,311	4,708	5,892	6,200	

T4004/9-13-81/F

[1]Does not include A&CO domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

APPENDIX B ALTERNATIVES 1, 2, 4, AND 6

B.1 DESCRIPTION

These alternatives use the same basic DDA layout as the Proposed Action, but different OB complex locations. Alternative 1 has the first OB complex near Coyote Spring Valley, Nevada, and the second OB complex near Beryl, Utah. Alternative 2 also has the first OB complex near Coyote Spring Valley; but the second OB complex is near Delta, Utah. The first OB complex is located near Beryl, and the second OB complex near Coyote Spring Valley for Alternative 4. Alternative 6 has the first OB complex located near Milford, Utah, and the second OB complex is near Coyote Spring Valley.

B.2 CONSTRUCTION SCENARIO

The construction plan used for Alternatives 1, 2, 4, and 6 is almost identical to the plan for the Proposed Action, as shown in Figure A.2-1 of Appendix A. The same number of concrete plants, construction camps, and marshalling yards/staging areas are required. Minor adjustments are needed because of the alternate OB complex locations.

OB COMPLEX CONSTRUCTION (B.2.1)

The construction scenario described in Appendix A for the OB complexes for the Proposed Action is also valid for Alternatives 1, 2, 4, and 6. The only variation is the location for each of the OB complexes. See Figures A.2.1-1 and A.2.1-2 in Appendix A for the construction schedules for the first and second OB complexes, respectively.

DDA CONSTRUCTION (B.2.2)

Since the DDA is identical for the Proposed Action and Alternatives 1, 2, 4, and 6, there is no significant change to the construction plan for the DDA. Selection of different clusters for IOC would not revise the construction schedule shown in Figure A.2.2-1 of Appendix A.

B.3 CONSTRUCTION RESOURCE REQUIREMENTS

Tables A.3-1 through A.3-5 apply to Alternatives 1, 2, 4, and 6, as well as the Proposed Action. See Appendix A for the discussion of the construction resource requirements for the Proposed Action.

OB COMPLEXES (B.3.1)

Since the construction schedules for the OB complexes for Alternatives 1, 2, 4, and 6 are identical to those for the Proposed Action, the construction resource requirements will also be the same. See Table A.3.1-1 in Appendix A for the total OB complex construction resources.

DDA (B.3.2)

As in the case with the OB complexes, the construction schedule for DDA for the Proposed Action and Alternatives 1, 2, 4, and 6 is the same; therefore the construction resource requirements are the same. See Table A.3.2-1 in Appendix A for these resources.

APPENDIX C ALTERNATIVES 3 AND 5

C.1 DESCRIPTION

These alternatives also use the same basic DDA layout as the Proposed Action, but different OB complex locations. The first OB complex is located near Beryl, Utah, and the second OB complex near Ely, Nevada, for Alternative 3. Alternative 5 has the first OB complex located near Milford, Utah, and the second OB complex is also near Ely.

C.2 CONSTRUCTION SCENARIO

The construction plan used for Alternatives 3 and 5 is almost identical to the plan for the Proposed Action, as shown in Figure A.2-1 of Appendix A. The same number of concrete plants, construction camps, and marshalling yards/staging areas are required. Minor adjustments are needed because of the alternate OB complex locations. The primary reason for differentiating between Alternatives 3 and 5, and the Proposed Action and Alternatives 1, 2, 4, and 6, is that the second OB complex is located at Ely for Alternatives 3 and 5. The AOCC is located at the second OB. Construction would be accelerated in the direction of the second OB complex to permit early operation of the AOCC.

OB COMPLEX CONSTRUCTION (C.2.1)

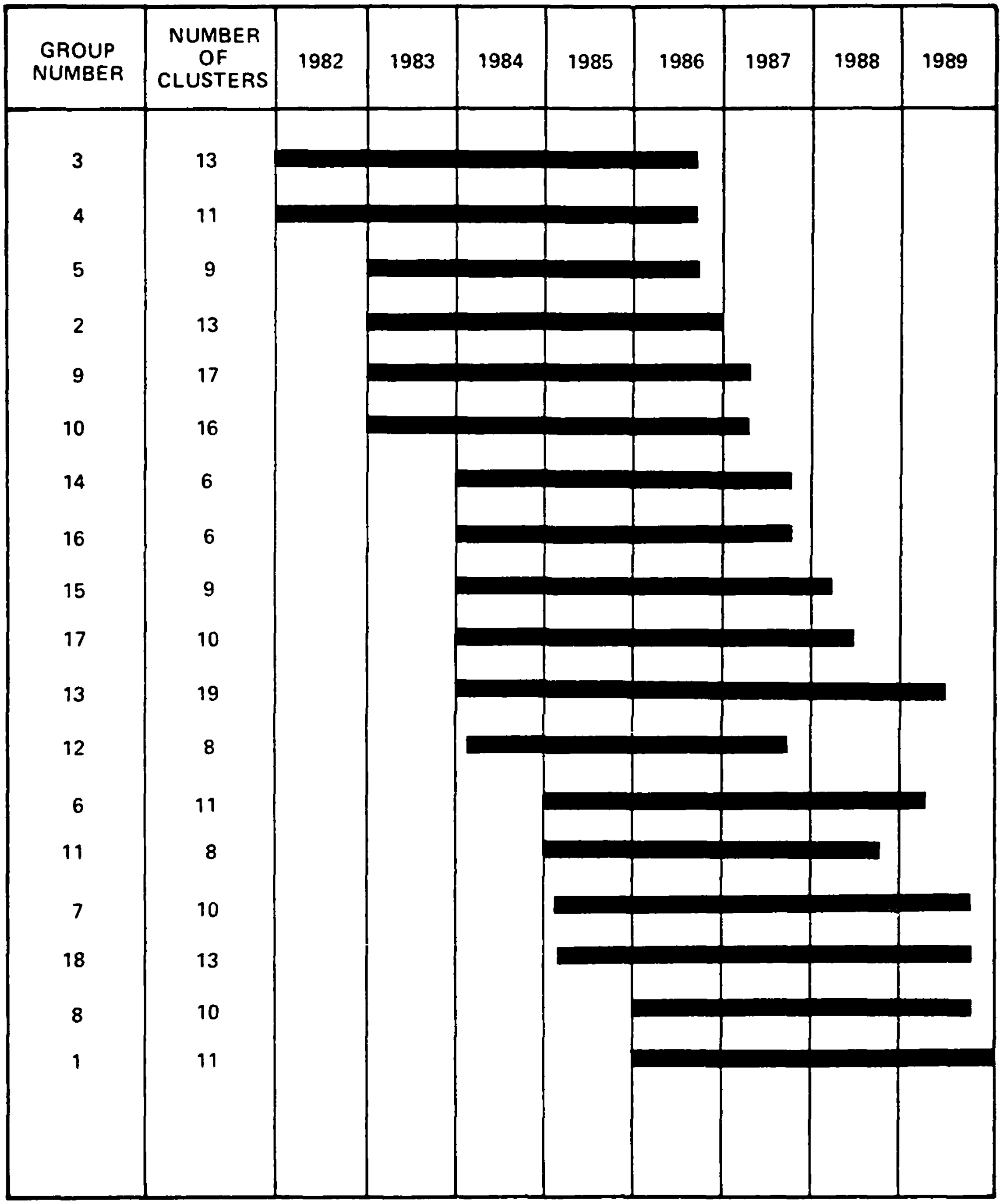
The construction scenario described in Appendix A for the OB complexes for the Proposed Action is also valid for Alternatives 3 and 5. The only variation is the location for each of the OB complexes. See Figures A.2.1-1 and A.2.1-2 in Appendix A for the construction schedules for the first and second OB complexes, respectively.

DDA CONSTRUCTION (C.2.2)

The construction groups for Alternatives 3 and 5 are identical to those for the Proposed Action, but the timing of construction for each group is different. The construction operations will be pursued in accordance with the schedule shown in Figure C.2.2-1. Work would begin at Escalante Desert Valley, where the first OB complex construction terminates, proceed north to Wah Wah and Pine valleys, and then branch out to progress through Utah and Nevada. Construction will peak in 1986. Schedule changes for specific construction groups could be made.

C.3 CONSTRUCTION RESOURCE REQUIREMENTS

Table C.3-1 shows the average direct personnel required for any given year. This table includes construction, A&CO, and operations personnel. The peak year for onsite construction personnel occurs in 1986 with approximately 19,600 required. Onsite A&CO personnel requirements peak over a three-year period, 1987-1989, with about 5,800 people needed in each of the years. The requirements for operations personnel are the same as for the Proposed Action, with the peak occurring in 1989 and approximately 13,300 people needed. Tables C.3-2 and C.3-3 give a more detailed breakdown of construction and A&CO personnel requirements, respectively. See Table A.3-4 in Appendix A for the detailed operations personnel requirements, since they are identical to the Proposed Action.



Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

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Figure C.2.2-1. DDA construction schedule for Alternatives 3 and 5, full deployment, Nevada/Utah.

Table C.3-1. Average direct personnel requirements for DDA and OB facilities for Alternatives 3 and 5, full deployment, Nevada/Utah, 1981-1991.

Description	Personnel 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Onsite/Location											
Construction											
DDA[1]		727	3,016	6,674	14,827	15,916	13,576	11,390	4,272		
OB Complexes[2,3]		1,392	2,936	2,941	4,495	3,721	2,951	718			
Subtotal		2,119	5,952	9,615	19,322	19,637	16,527	12,108	4,272		
A&CO											
DDA[1]		10	100	300	1,250	4,000	4,300	4,350	4,350	100	
OB Complexes[2,3]		50	200	500	900	1,450	1,500	1,450	1,450	350	
Subtotal		60	300	800	2,150	5,450	5,800	5,800	5,800	450	
Operations											
OB Complexes[2,3]			39	234	2,642	5,923	9,668	12,219	13,330	13,330	13,330
Total Onsite		2,179	6,291	10,649	24,114	31,010	31,995	30,127	23,402	13,780	13,330
Offsite/Location											
Construction											
Salt Lake City	77	208	347	410	410	410	410	300	100	100	
A&CO											
Las Vegas	30	250	500	600	300						
Total Offsite	107	458	847	1,010	710	410	410	300	100	100	
Grand Total	107	2,637	7,138	11,659	24,824	31,420	32,405	30,427	23,502	13,880	13,330

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[1] DDA includes PS, ASC, DTN, CMF, RSS, and CR.

[2] First OB complex includes OB, DAA, OBTS, and airfield.

[3] Second OB complex includes OB and airfield.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table C.3-2. Average direct construction personnel requirements for DDA and OB facilities for Alternatives 3 and 5, full deployment, Nevada/Utah, 1981-1990.

	Construction Personnel									
Group Number[1]	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Onsite										
1						352	600	1,467	1,449	
2			417	909	1,958	1,243				
3		391	676	332	1,823	1,165				
4		336	580	459	1,810	681				
5			299	706	1,819	380				
6					346	594	1,248	1,701	118	
7					308	529	451	1,801	519	
8						327	553	1,746	982	
9			532	1,254	1,888	1,708	184			
10			512	1,214	1,892	1,519	175			
11					267	454	1,587	640		
12				267	454	1,550	814			
13				547	176	936	1,768	1,849	948	
14				200	339	1,416	470			
15				282	483	729	1,616	97		
16				196	333	1,055	981			
17				308	529	591	1,801	377		
18					402	687	1,328	1,712	256	
Subtotal DDA		727	3,016	6,674	14,827	15,916	13,576	11,390	4,272	
First OB Complex[2]		1,392	2,936	2,762	2,618	1,565	1,052			
Second OB Complex[3]				179	1,877	2,156	1,899	718		
Subtotal OB		1,392	2,936	2,941	4,495	3,721	2,951	718		
Total Onsite		2,119	5,952	9,615	19,322	19,637	16,527	12,108	4,272	
Offsite										
Salt Lake City	77	208	347	410	410	410	410	300	100	100
Grand Total	77	2,327	6,299	10,025	19,732	20,047	16,937	12,408	4,372	100

T5493/10-2-81/F/b

1See Figures A.2-1 and C.2.2-1.

2See Figure A.2.1-1

3See Figure A.2.1-2.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table C.5-3. Average A&CO personnel requirements for DDA and OB facilities for Alternatives 3 and 5, full deployment, Nevada/Utah, 1981-1990.

	A&CO Personnel									
Group Number[1]	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Onsite										
1								32	1,084	
2				30	50	620				
3				30	50	1,003	333			
4		10	100	60	1,000	1,381				
5				60	50	797				
6							26	498	386	
7							7	48	819	
8								44	855	100
9				60	50	43	1,004			
10				60	50	39	1,000			
11							37	620		
12						32	689	150		
13						7	44	198	1,206	
14						32	515			
15						14	211	600		
16						21	359	300		
17						11	44	612		
18							31	1,248		
Subtotal DDA		10	100	300	1,250	4,000	4,300	4,350	4,350	100
First OB Complex[2]		50	200	500	900	1,450	1,450	1,450	1,450	350
Second OB Complex[3]							50			
Subtotal OB		50	200	500	900	1,450	1,500	1,450	1,450	350
Total Onsite		60	300	800	2,150	5,450	5,800	5,800	5,800	450
Offsite										
Las Vegas	30	250	500	600	300					
Grand Total	30	310	800	1,400	2,450	5,450	5,800	5,800	5,800	450

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[1]See Figures A.2-1 and C.2.2-1.
[2]See Figure A.2.1-1.
[3]See Figure A.2.1-2.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

The total construction resources for Alternatives 3 and 5 are shown in Table C.3-4. The total requirements are the same as for the Proposed Action. See the general discussion of the total construction resources at the beginning of subsection A.3 in Appendix A.

OB COMPLEXES (C.3.1)

Since the construction schedules for the OB complexes for Alternatives 3 and 5 are identical to those for the Proposed Action, the construction resources will also be the same. See Table A.3.1-1 in Appendix A for the total OB complex construction resource requirements.

DDA (C.3.2)

The total resource requirements associated with construction of the DDA for Alternatives 3 and 5 are shown in Table C.3.2-1. Since the DDA is the same for both the Proposed Action and Alternatives 3 and 5, the total construction resources required are the same, only the yearly requirements are different. See the general discussion of the total construction resources at the beginning of subsection A.3 in Appendix A. Except for building construction, the comments also apply to DDA construction.

Table C.3-4. Total construction resources for DDA and OB facilities for Alternatives 3 and 5, full deployment, Nevada/Utah, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	3,040	17,731	33,090	33,109	40,214	20,016	10,660	4,873
Cumulative	3,040	20,771	53,861	86,970	127,184	147,200	157,860	162,733
Disturbed Area (acres)[2]								
Incremental	2,886	15,664	28,847	33,163	39,389	21,850	13,580	6,208
Cumulative	2,886	18,550	47,397	80,560	119,949	141,799	155,379	161,587
Steel (tons)								
Incremental	377	796	6,353	82,878	87,430	83,172	91,700	43,485
Cumulative	377	1,173	7,526	90,404	177,834	261,006	352,706	396,191
Concrete (cu yd*1,000)								
Incremental	78	166	207	852	844	771	712	319
Cumulative	78	244	451	1,303	2,147	2,918	3,630	3,949
Asphalt (tons*1,000)								
Incremental	825	1,990	2,287	1,742	889	182	44	
Cumulative	825	2,815	5,102	6,844	7,733	7,915	7,959	

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Table C.3-4. Total construction resources for DDA and OB facilities for Alternatives 3 and 5, full deployment, Nevada/Utah, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	1,031	6,959	13,162	9,551	12,621	4,352	69	
Cumulative	1,031	7,990	21,152	30,703	43,324	47,676	47,745	
Prime Coat (tons)								
Incremental	3,448	8,184	9,275	7,760	4,405	1,579	384	
Cumulative	3,448	11,632	20,907	28,667	33,072	34,651	35,035	
Fencing (lin ft*1,000)								
Incremental	8	17	105	1,325	1,397	1,327	1,459	692
Cumulative	8	25	130	1,455	2,852	4,179	5,638	6,330

T5103/9-13-81/F

[1] Does not include A&CO or operations domestic uses.

[2] Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

Table C.3.2-1. Total DDA construction resources for Alternatives 3 and 5, full deployment, Nevada/Utah, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	2,568	16,735	32,093	31,584	38,952	19,014	10,416	4,873
Cumulative	2,568	19,303	51,396	82,980	121,932	140,946	151,362	156,235
Disturbed Area (acres)[2]								
Incremental	1,972	13,736	26,915	30,211	36,945	19,912	13,108	6,208
Cumulative	1,972	15,708	42,623	72,834	109,779	129,691	142,799	149,007
Steel (tons)								
Incremental			5,556	81,660	86,422	82,372	91,505	43,485
Cumulative			5,556	87,216	173,638	256,010	347,515	391,000
Concrete (cu yd*1,000)								
Incremental			41	599	634	605	672	319
Cumulative			41	640	1,274	1,879	2,551	2,870
Asphalt (tons*1,000)								
Incremental	739	1,809	2,106	1,465	660			
Cumulative	739	2,548	4,654	6,119	6,779			

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Table C.3.2-1. Total DDA construction resources for Alternatives 3 and 5, full deployment, Nevada/Utah, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	897	6,677	12,879	9,119	12,264	4,069		
Cumulative	897	7,574	20,453	29,572	41,836	45,905		
Prime Coat (tons)								
Incremental	2,703	6,613	7,701	5,355	2,414			
Cumulative	2,703	9,316	17,017	22,372	24,786			
Fencing (lin ft*1,000)								
Incremental			88	1,299	1,375	1,310	1,455	692
Cumulative			88	1,387	2,762	4,072	5,527	6,219
Protective Shelters								
Incremental			65	961	1,017	969	1,077	511
Cumulative			65	1,026	2,043	3,012	4,089	4,600
Mi of DTN								
Incremental	159	389	453	315	142			
Cumulative	159	548	1,001	1,316	1,458			
Mi of Cluster Roads								
Incremental	5	744	1,700	1,209	1,877	665		
Cumulative	5	749	2,449	3,658	5,535	6,200		

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[1] Does not include A&CO domestic uses.

[2] Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

APPENDIX D ALTERNATIVE 7

D.1 DESCRIPTION

Alternative 7, full deployment in Texas/New Mexico, has the first OB complex near Clovis, New Mexico, and the second OB complex near Dalhart, Texas.

D.2 CONSTRUCTION SCENARIO

The construction plan used in the analysis of full deployment in Texas/New Mexico (Alternative 7) with OB complexes near Clovis and Dalhart is shown in Figure D.2-1. It is estimated that six or seven concrete plants would be required in a total of 16 different locations. Construction camps would be colocated with the concrete plants. Water availability, aggregate availability, and minimum haul distances will be the final determining factors in the exact locations for these plants.

OB COMPLEX CONSTRUCTION (D.2.1)

The need for construction camps at the OB complexes for full deployment in Texas/New Mexico is not the same as in the Nevada/Utah region. The first OB complex near Clovis will require a construction camp, but the second OB complex near Dalhart will not. The proximity of the DDA and its construction camp in construction group 11 (see Figure D.2-1) to the second OB complex will allow the construction camp to be used for both the DDA and the OB complex.

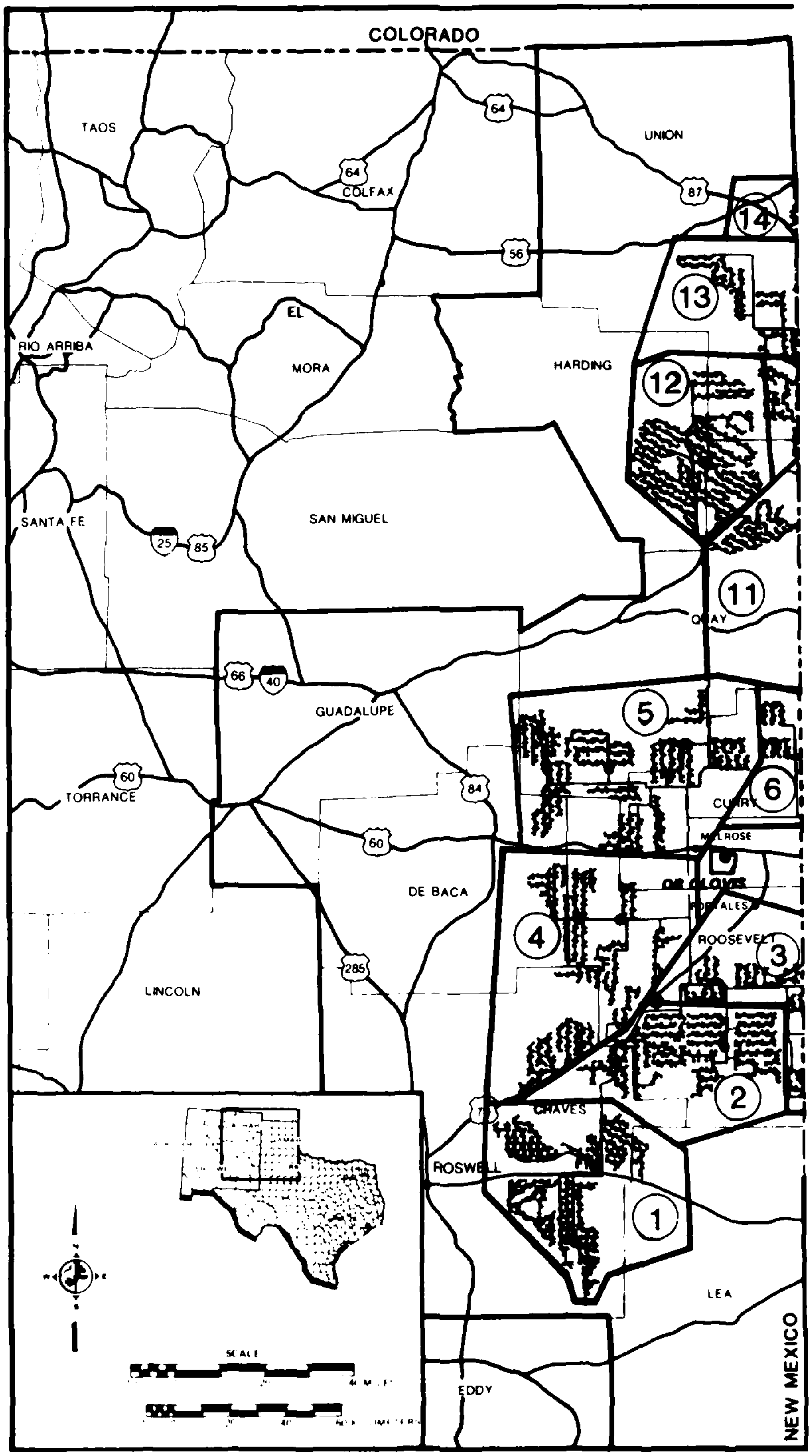
The construction scheduling for the OB complexes was identical to that for the *Proposed Action*. The first OB complex near Clovis would be constructed between 1982 and 1987. Construction of the second OB complex near Dalhart will be between 1984 and 1988. Studies now in progress may change this preliminary scheduling.

Additionally, the construction scenario for the OB complexes for Alternative 7 is identical with that for the Proposed Action (see Appendix A) with the exception, as stated above, that the second OB complex will be built from the construction camp associated with the DDA in group 11.

Figures A.2.1-1 and A.2.1-2 in Appendix A show the construction schedules associated with the first and second OB complexes, respectively.

DDA CONSTRUCTION (D.2.2)

Protective shelters, DTN, and cluster roads are the major construction items that originate from the plants. A range of between approximately 180 and 440 protective shelters could be built from a plant. The range of DTN mileage built from a plant is between about 50 and 170 mi. Between about 240 and 570 mi of cluster roads can be constructed from a plant. Of the 5,940 mi of cluster roads required for Alternative 7, approximately 4,960 mi will have a 10-in. surface thickness and the remaining 1,240 mi will have a 19-in. surface thickness (see subsection 3.2.2 of this ETR for more information).



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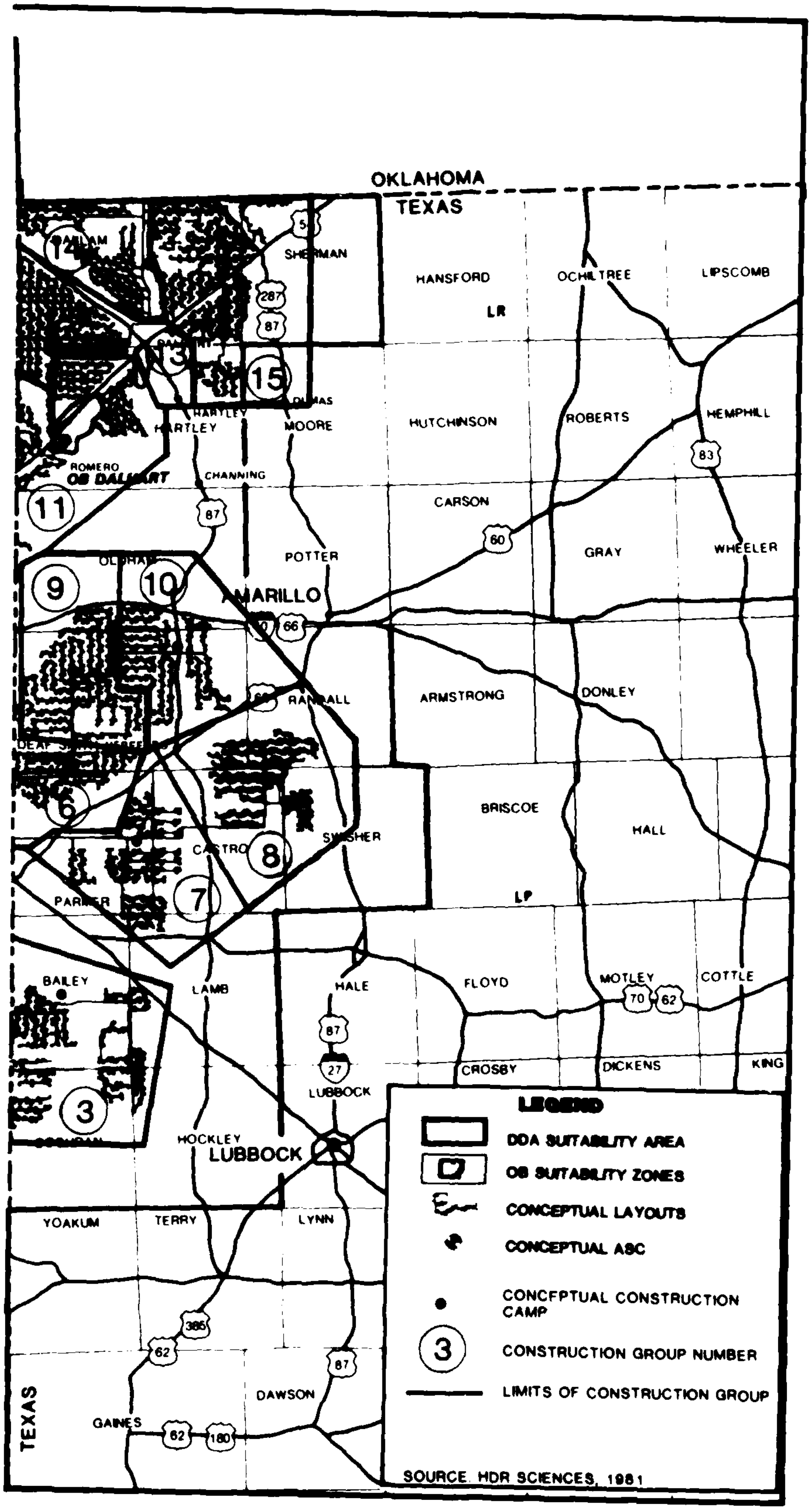


Figure D.2-1. System layout with construction plan for Alternative 7, full deployment, Texas/New Mexico.

Fifteen construction groups with from 8 to 19 clusters were organized. The schedule for construction is shown in Figure D.2.2-1. Construction would begin at group 5, where the first OB complex construction terminates. Detailed schedules and milestones will be established following final review of inputs and additional engineering.

D.3 CONSTRUCTION RESOURCE REQUIREMENTS

Table D.3-1 shows that the peak demand for onsite construction, A&CO, and operations personnel occurs in 1987 with approximately 32,000 persons employed. Onsite personnel requirements for construction peak in 1986 with approximately 18,800 employees. Similar to the Proposed Action, onsite A&CO personnel requirements peak over a three-year span, 1987-1989, with about 5,600 people needed in each of the years. Operations personnel will reach about 13,300 by late 1989, and remain constant thereafter. Tables D.3-2 and D.3-3 give a more detailed breakdown for the construction and A&CO personnel requirements. Operations personnel requirements are the same as for the Proposed Action. See Table A.3-4 in Appendix A for a more detailed breakdown.

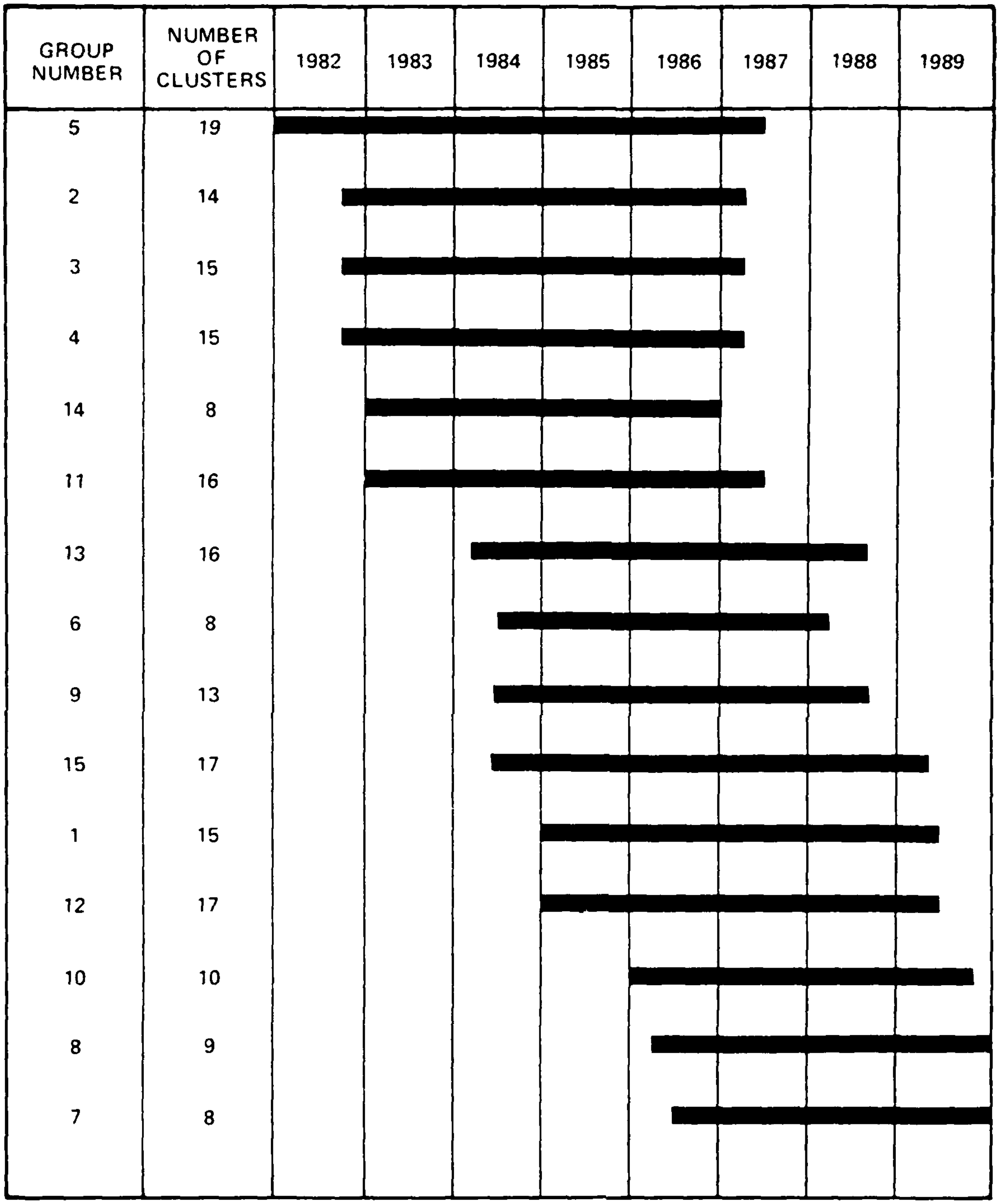
Table D.3-4 shows the total construction resources required for Alternative 7. The same conditions apply to Alternative 7 as they do to the Proposed Action, as discussed in Appendix A.

OB COMPLEXES (D.3.1)

The total construction resources required for both OB complexes are shown in Table D.3.1-1. As is the situation with the Proposed Action, the peak year for all the construction resources is 1985. See subsection A.3.1 in Appendix A for a discussion of construction resource requirements for OB complexes.

DDA (D.3.2)

The total resource requirements associated with construction of the DDA for Texas/New Mexico full deployment are shown in Table D.3.2-1. See the general discussion of the total construction resources at the beginning of subsection A.3 in Appendix A. Except for building construction, the comments also apply to DDA construction.



Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Figure D.2.2-1. DDA construction schedule for Alternative 7, full deployment, Texas/New Mexico.

Table D.3-1. Average direct personnel requirements for DDA and OB facilities for Alternative 7, full deployment, Texas/New Mexico, 1981-1991.

Description	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
	Personnel										
Onsite Location											
Construction											
DDA[1]		681	2,826	6,594	13,692	15,032	13,641	10,616	4,358		
OB Complexes[2,3]		1,392	2,755	2,941	4,495	3,721	2,951	718			
Subtotal		2,073	5,581	9,535	18,187	18,753	16,592	11,334	4,358		
A&CO											
DDA[1]		10	100	300	1,250	4,000	4,300	4,350	4,350	100	
OB Complexes[2,3]		50	200	500	900	1,250	1,300	1,250	1,250	250	
Subtotal		60	300	800	2,150	5,250	5,600	5,600	5,600	350	
Operations											
OB Complexes[2,3]			39	234	2,642	5,923	9,668	12,219	13,330	13,330	13,330
Total Onsite		2,133	5,920	10,569	22,979	29,926	31,860	29,153	23,288	13,680	13,330
Offsite Location											
Construction											
Roads	77	208	347	410	410	410	410	300	100	100	
A&CO											
Airfield	30	250	500	600	300	200	200	200	200	100	
Total Offsite	107	458	847	1,010	710	610	610	500	300	200	
Grand Total	107	2,591	6,767	11,579	23,689	30,536	32,470	29,653	23,588	13,880	13,330

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[1]DDA includes PS, ASC, DTN, CMF, RSS, and CR.

[2]First OB complex includes OB, DAA, OBTS, and airfield. The possibility of using the airfield at Clovis exists, but was not considered for this analysis.

[3]Second OB complex includes OB and airfield.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table D.3-2. Average direct construction personnel requirements for DDA and OB facilities for Alternative 7, full deployment, Texas/New Mexico, 1981-1990

Group Number[1]	Construction Personnel									
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Onsite/Location										
1					435	829	1,639	1,694	382	
2		64	370	915	1,652	1,568	291			
3		69	397	967	1,664	1,500	382			
4		69	397	965	1,662	1,504	382			
5		479	938	1,407	1,891	1,246	176			
6				110	368	955	1,544	75		
7						110	368	1,386	1,048	
8						198	445	1,401	1,122	
9				166	558	1,023	1,870	709		
10						285	591	1,602	1,086	
11			471	1,018	1,662	1,748	471			
12				501	1,070	1,673	1,682	561		
13				340	757	1,391	1,905	838		
14				253	492	1,824	343			
15					214	718	1,262	1,904	1,229	159
Subtotal DDA		681	2,826	6,594	13,692	15,032	13,641	10,616	4,358	
First OB Complex[2]		1,392	2,755	2,762	2,618	1,565	1,052			
Second OB Complex[3]				179	1,877	2,156	1,899	718		
Subtotal OB		1,392	2,755	2,941	4,495	3,721	2,951	718		
Total Onsite		2,073	5,581	9,535	18,187	18,753	16,592	11,334	4,358	
Offsite/Location										
Clovis	77	208	347	410	410	410	410	300	100	100
Grand Total	77	2,281	5,928	9,945	18,597	19,163	17,002	11,634	4,458	100

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[1]See Figures D.2-1 and D.2.2-1.

[2]See Figure A.2.1-1.

[3]See Figure A.2.1-2.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table D.3-3. Average A&CO personnel requirements for DDA and OB facilities for Alternative 7, full deployment, Texas/New Mexico, 1981-1990.

Group Number[1]	A&CO Personnel									
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Onsite/Location										
1							40	60	1,192	
2				50	48	1,164	364			
3				75	48	674				
4		10	100	75	998	1,801				
5				75	48	202	1,096			
6						3	53	880		
7								35	863	
8					48			50	840	
9						28	53	1,061		
10								60	875	100
11				25	48	41	1,273			
12						7	53	589	580	
13					12	41	545	529		
14						10	770			
15						29	53	1,086		
Subtotal DDA		10	100	300	1,250	4,000	4,300	4,350	4,350	100
Onsite/Location										
First OB Complex[2]		50	200	500	900	1,250	1,250	1,250	1,250	250
Second OB Complex[3]							50			
Subtotal OB		50	200	500	900	1,250	1,300	1,250	1,250	250
Total Onsite		60	300	800	2,150	5,250	5,600	5,600	5,600	350
Offsite/Location										
Amarillo	30	250	500	600	300	200	200	200	200	100
Grand Total	30	310	800	1,400	2,450	5,450	5,800	5,800	5,800	450

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[1]See Figures D.2-1 and D.2.2-1.

[2]See Figure A.2.1-1.

[3]See Figure A.2.1-2.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table D.3-4. Total construction resources for DDA and OB facilities for Alternative 7, full deployment, Texas/New Mexico, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	3,924	16,010	32,901	26,359	37,764	21,333	12,701	4,824
Cumulative	3,924	19,934	52,835	79,194	116,958	138,291	150,992	155,816
Disturbed Area (acres)[2]								
Incremental	3,586	14,088	28,925	26,429	38,183	23,501	15,158	6,134
Cumulative	3,586	17,674	46,599	73,028	111,211	134,712	149,870	156,004
Steel (tons)								
Incremental	381	754	4,750	63,009	102,269	94,078	87,985	42,964
Cumulative	381	1,135	5,885	68,894	171,163	265,241	353,226	396,190
Concrete (cu yd*1,000)								
Incremental	79	157	196	710	955	853	685	315
Cumulative	79	236	432	1,142	2,097	2,950	3,635	3,950
Asphalt (tons*1,000)								
Incremental	1,112	2,228	961	1,492	810	395	45	
Cumulative	1,112	3,340	4,301	5,793	6,603	6,998	7,043	

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Table D.3-4. Total construction resources for DDA and OB facilities for Alternative 7, full deployment, Texas/New Mexico, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	1,340	6,165	13,499	7,636	10,932	4,368	1,144	
Cumulative	1,340	7,505	21,004	28,640	39,572	43,940	45,084	
Prime Coat (tons)								
Incremental	4,503	9,008	4,435	6,858	4,128	2,366	388	
Cumulative	4,503	13,511	17,946	24,804	28,932	31,298	31,686	
Fencing (lin ft*1,000)								
Incremental	8	16	80	1,010	1,632	1,501	1,400	683
Cumulative	8	24	104	1,114	2,746	4,247	5,647	6,330

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[1] Does not include A&CO or operations domestic uses.

[2] Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

Table D-3.1-1. Total OB complex construction resources for Alternative 7, full deployment, Texas/New Mexico, 1982-1988.

Construction Resources	Quantity Per Year						
	1982	1983	1984	1985	1986	1987	1988
Water (acre-ft)[1]							
Incremental	476	942	1,005	1,537	1,272	1,009	245
Cumulative	476	1,418	2,423	3,960	5,232	6,241	6,486
Disturbed Area (acres)[2]							
Incremental	923	1,827	1,950	2,980	2,467	1,957	476
Cumulative	923	2,750	4,700	7,680	10,147	12,104	12,580
Steel (tons)							
Incremental	381	754	805	1,229	1,018	807	196
Cumulative	381	1,135	1,940	3,169	4,187	4,994	5,190
Concrete (cu yd*1,000)							
Incremental	79	157	167	256	212	168	41
Cumulative	79	236	403	659	871	1,039	1,080
Asphalt (tons*1,000)							
Incremental	86	171	183	280	231	184	45
Cumulative	86	257	440	720	951	1,135	1,180
Aggregate (cu yd*1,000)							
Incremental	135	267	285	436	361	286	70
Cumulative	135	402	687	1,123	1,484	1,770	1,840
Prime Coat (tons)							
Incremental	752	1,488	1,589	2,428	2,010	1,594	388
Cumulative	752	2,240	3,829	6,257	8,267	9,861	10,249
Fencing (lin ft*1,000)							
Incremental	8	16	17	27	22	17	4
Cumulative	8	24	41	68	90	107	111

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[1]Does not include A&CO or operations domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

Table D.3.2-1. Total DDA construction resources for Alternative 7, full deployment, Texas/New Mexico, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	3,448	15,068	31,896	24,822	36,492	20,324	12,456	4,824
Cumulative	3,448	18,516	50,412	75,234	111,726	132,050	144,506	149,330
Disturbed Area (acres)[2]								
Incremental	2,663	12,261	26,975	23,449	35,716	21,544	14,682	6,134
Cumulative	2,663	14,924	41,899	65,348	101,064	122,608	137,290	143,424
Steel (tons)								
Incremental			3,945	61,780	101,251	93,271	87,789	42,964
Cumulative			3,945	65,725	166,976	260,247	348,036	391,000
Concrete (cu yd*1,000)								
Incremental			29	454	743	685	644	315
Cumulative			29	483	1,226	1,911	2,555	2,870
Asphalt (tons*1,000)								
Incremental	1,026	2,057	778	1,212	579	211		
Cumulative	1,026	3,083	3,861	5,073	5,652	5,863		

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Table D.3.2-1. Total DDA construction resources for Alternative 7, full deployment, Texas/New Mexico, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	1,205	5,898	13,214	7,200	10,571	4,082	1,074	
Cumulative	1,205	7,103	20,317	27,517	38,088	42,170	43,244	
Prime Coat (tons)								
Incremental	3,751	7,520	2,846	4,430	2,118	772		
Cumulative	3,751	11,271	14,117	18,547	20,665	21,437		
Fencing (lin ft*1,000)								
Incremental			63	983	1,610	1,484	1,396	683
Cumulative			63	1,046	2,656	4,140	5,536	6,219
Protective Shelters								
Incremental			46	727	1,191	1,097	1,034	505
Cumulative			46	773	1,964	3,061	4,095	4,600
Mi of DTN								
Incremental	221	442	167	261	125	45		
Cumulative	221	663	830	1,091	1,216	1,261		
Mi of Cluster Roads								
Incremental		569	2,010	944	1,616	627	175	
Cumulative		569	2,579	3,523	5,139	5,766	5,941	

T4001/9-13-81/F

[1]Does not include A&CO domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

APPENDIX E ALTERNATIVE 8

E.1 DESCRIPTION

Alternative 8, split deployment, proposes a first OB complex near Coyote Spring Valley, Nevada with a second OB complex near Clovis, New Mexico. Split deployment denotes dividing the required 200 clusters into several deployment regions. The alternative under consideration will distribute the clusters among the four states of Nevada, Utah, Texas, and New Mexico.

E.2 CONSTRUCTION SCENARIO

The construction plan used in the analysis of the portion of Alternative 8 for the Nevada/Utah region with the first OB complex near Coyote Spring Valley is shown in Figure E.2-1. The construction plan for the Texas/New Mexico portion of Alternative 8, with the second OB complex near Clovis is shown in Figure E.2-2.

For the split deployment portion in Nevada/Utah, three or four concrete plants would be required in a total of nine different locations. In the Texas/New Mexico portion, three or four concrete plants would be needed in a total of eight different locations. Colocated with these plants would be the construction camps and marshalling yards/staging areas. The exact locations for these plants will be determined based on the following criteria: water availability, aggregate availability, and minimum haul distances.

OB COMPLEX CONSTRUCTION (E.2.1)

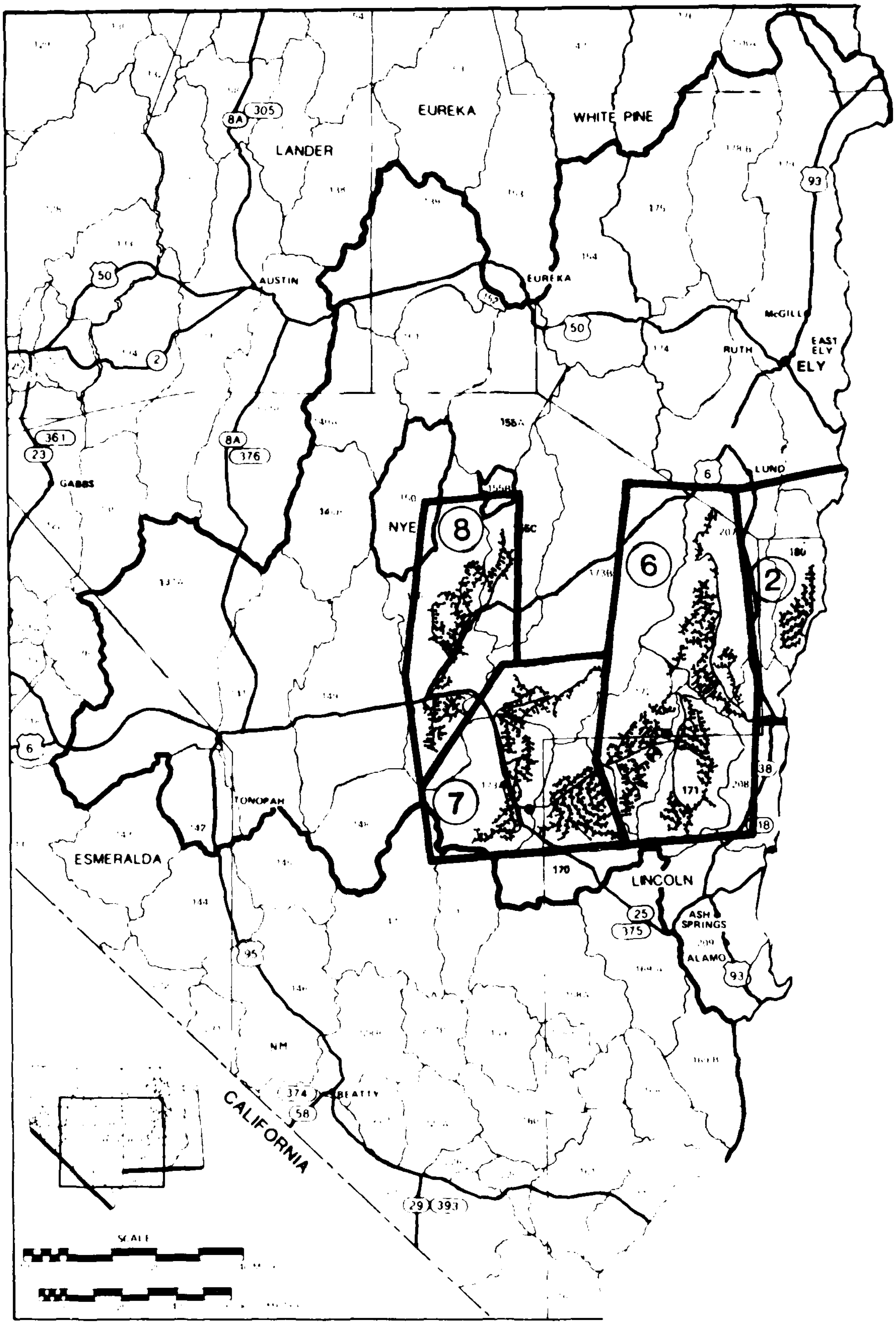
Each of the OB complexes will have a construction camp for the building construction.

The first OB complex, near Coyote Spring Valley, contains an OB, DAA, OBTS, and an airfield. The construction scenario described in Appendix A for the first OB complex for the Proposed Action is the same for Alternative 8. The construction schedule for the first OB complex is shown in Figure A.2.1-1 in Appendix A.

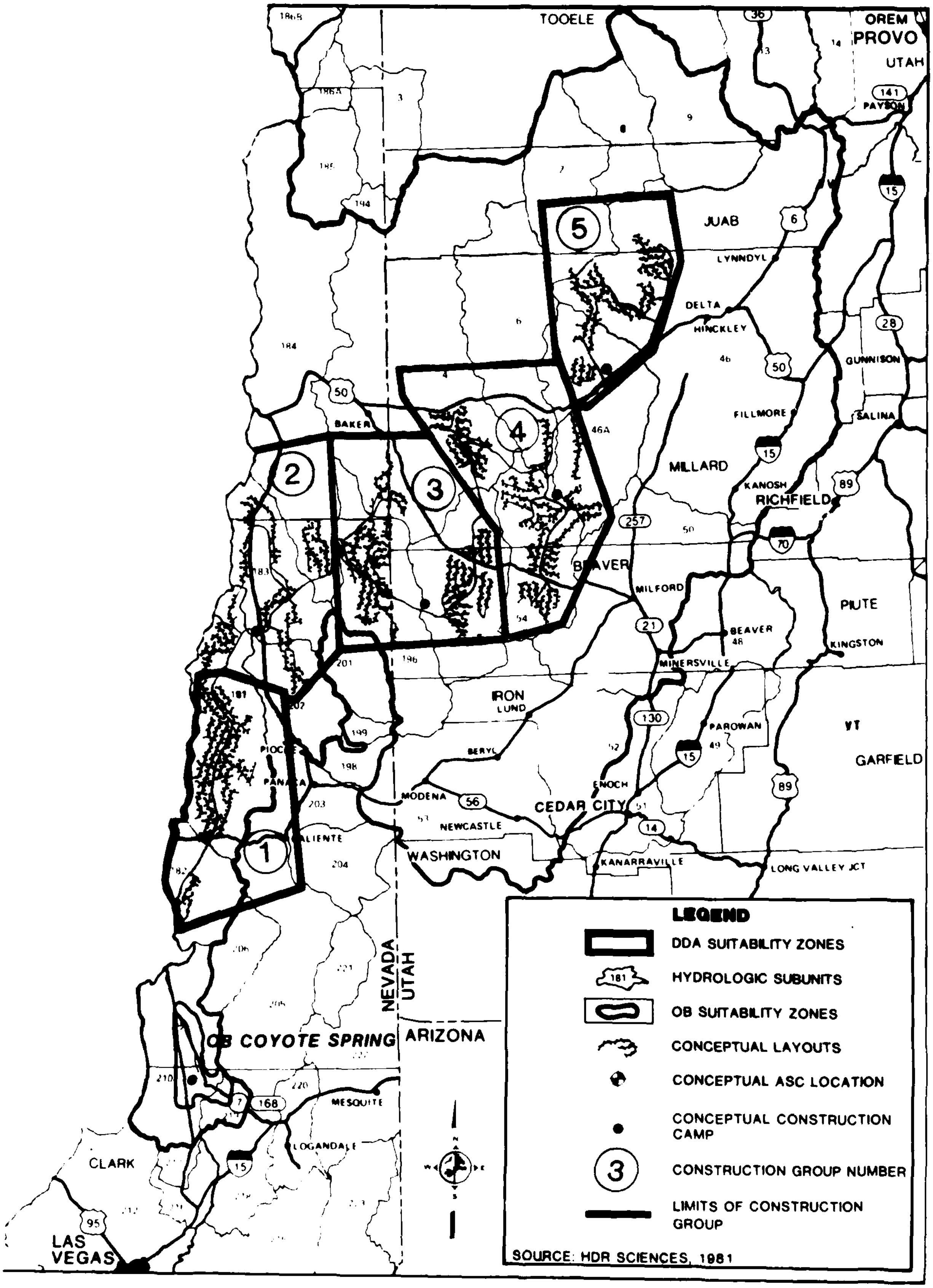
The second OB complex, near Clovis, contains an OB, DAA, and an airfield. Split deployment is the only alternative that requires a DAA in the second OB complex. Construction is scheduled to begin in 1982 and continue through 1987. The second OB complex does not have to be operational for IOC. Figure E.2.1-1 shows the construction schedule for the second OB complex.

DDA CONSTRUCTION (E.2.2)

The key construction items originating from the DDA plants are DTN, cluster roads, and protective shelters. The length of the DTN constructed from a plant ranges from about 50 and 160 mi. Between approximately 280 and 530 mi of cluster roads can be constructed from a plant. The number of protective shelters built from a plant ranges from about 200 to 390. For the 3,100 mi of cluster roads for the Nevada/Utah portion, approximately 2,480 mi will have a 10-in. surface thickness and the remaining 620 mi will have a 19-in. surface thickness. For the 2,970 mi of cluster roads for the Texas/New Mexico portion, about 2,380 mi will have a 10-in.

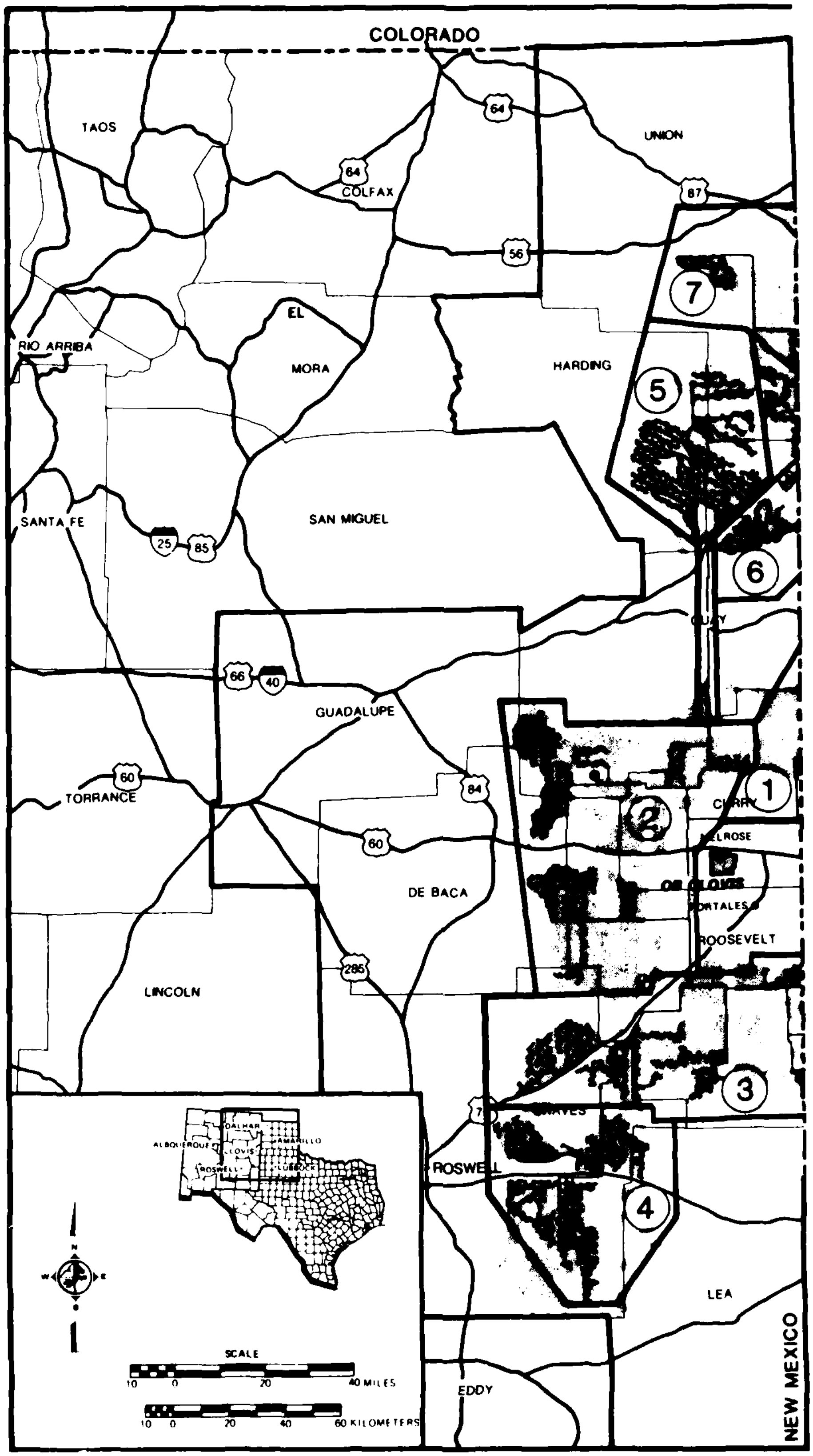


1952-E-2 3291-D-1

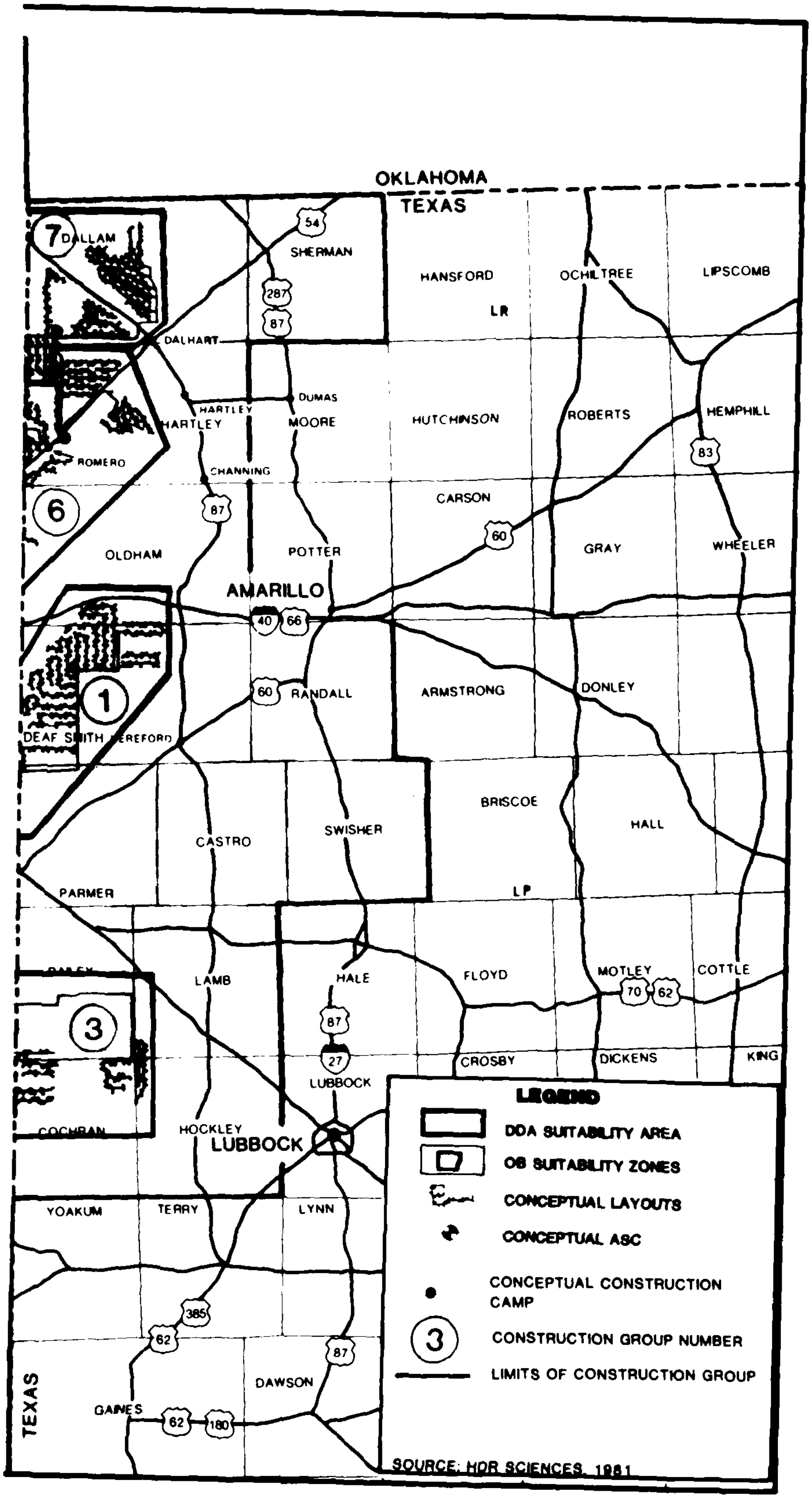


1952-E-2 3291-D-1

Figure E.2-1. System layout with construction plan for portion of Alternative 8, split deployment, Nevada/Utah.

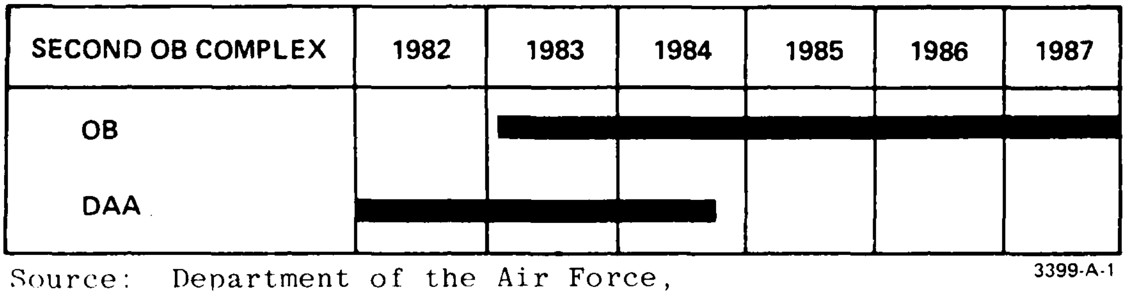


4700-E 3235-D-1 4481-D



4700-E 3235-D-1 4460-D

Figure E.2-2. System layout with construction plan for portion of Alternative 8, split deployment, Texas/New Mexico.



Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Figure E.2.1-1. Second OB complex construction schedule for portion of Alternative 8, split deployment, Texas/New Mexico.

surface thickness and the remaining 590 mi will have a 19-in. surface thickness. See subsection 3.2.2 of this ETR for more information.

Eight construction groups were used for the Nevada/Utah portion of Alternative 8. Construction would begin at Coyote Spring Valley, where the first OB complex construction terminates. Each group contains between 9 and 17 clusters. The construction operations will be pursued in accordance with the schedule shown in Figure E.2.2-1.

For the Texas/New Mexico portion of Alternative 8, seven construction groups, containing between 12 and 16 clusters were used. Construction operations for this representative system were analyzed in accordance with the schedule shown in Figure E.2.2-2. Construction would begin at group 2, where the second OB complex construction terminates. Changes to the construction schedule could be made.

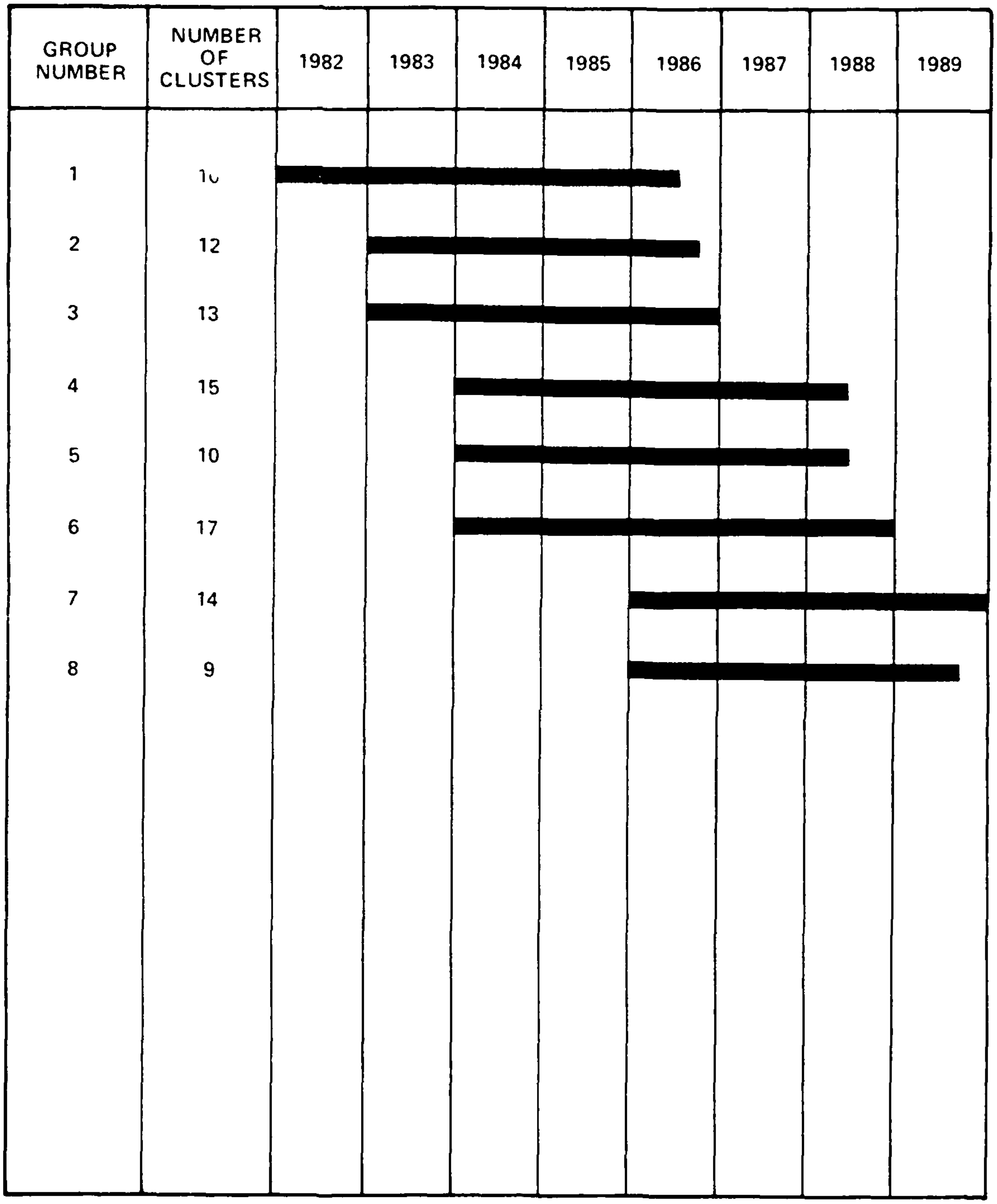
E.3 CONSTRUCTION RESOURCE REQUIREMENTS

Tables E.3-1 and E.3-2 show the average direct personnel required for Alternative 8 for any given year in Nevada/Utah and Texas/New Mexico, respectively. The peak year for onsite construction personnel occurs in 1985 for Nevada/Utah, with approximately 10,700 workers; and in 1986 for Texas/New Mexico, with approximately 10,100 workers. The overall average onsite construction work force for split deployment would peak in 1985 with approximately 20,100 personnel required. The combined onsite A&CO personnel requirements peak over a two-year span, 1987-1988, with about 8,500 people needed in each of the years. Combined operations personnel peak in 1989, at the time of FOC, with over 14,000 people required. Both A&CO and operations personnel required for Alternative 8 exceed the requirements for the Proposed Action. This is because the second OB complex for Alternative 8 has a DAA, whereas it does not for the Proposed Action. Tables E.3-3 through E.3-8 give a more detailed breakdown of personnel requirements for construction, A&CO, and operations.

The total construction resources for Alternative 8, split deployment in Nevada/Utah and in Texas/New Mexico, are shown in Tables E.3-9 and E.3-10, respectively. Generally, the cumulative construction resources requirements for Nevada/Utah and Texas/New Mexico (Alternative 8) are higher than for the full deployment alternatives because there is a DAA located in the second OB complex.The same general conditions apply to Alternative 8 as they do to the Proposed Action, as discussed in Appendix A, subsection A.3.

OB COMPLEXES (E.3.1)

Tables E.3.1-1 and E.3.1-2 show the total construction resources for the first OB complex (Nevada/Utah) and the second OB complex (Texas/New Mexico), respectively. The first OB complex is constructed between 1982 and 1987, with the peak year requirements generally occurring in 1983. The second OB complex is also constructed between 1982 and 1987, with 1984 generally being the peak year for construction resources. Most of the resources are associated with building construction. The rest are attributable to shelter construction at the OBTS, road construction throughout the complexes, and airfield construction.



Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

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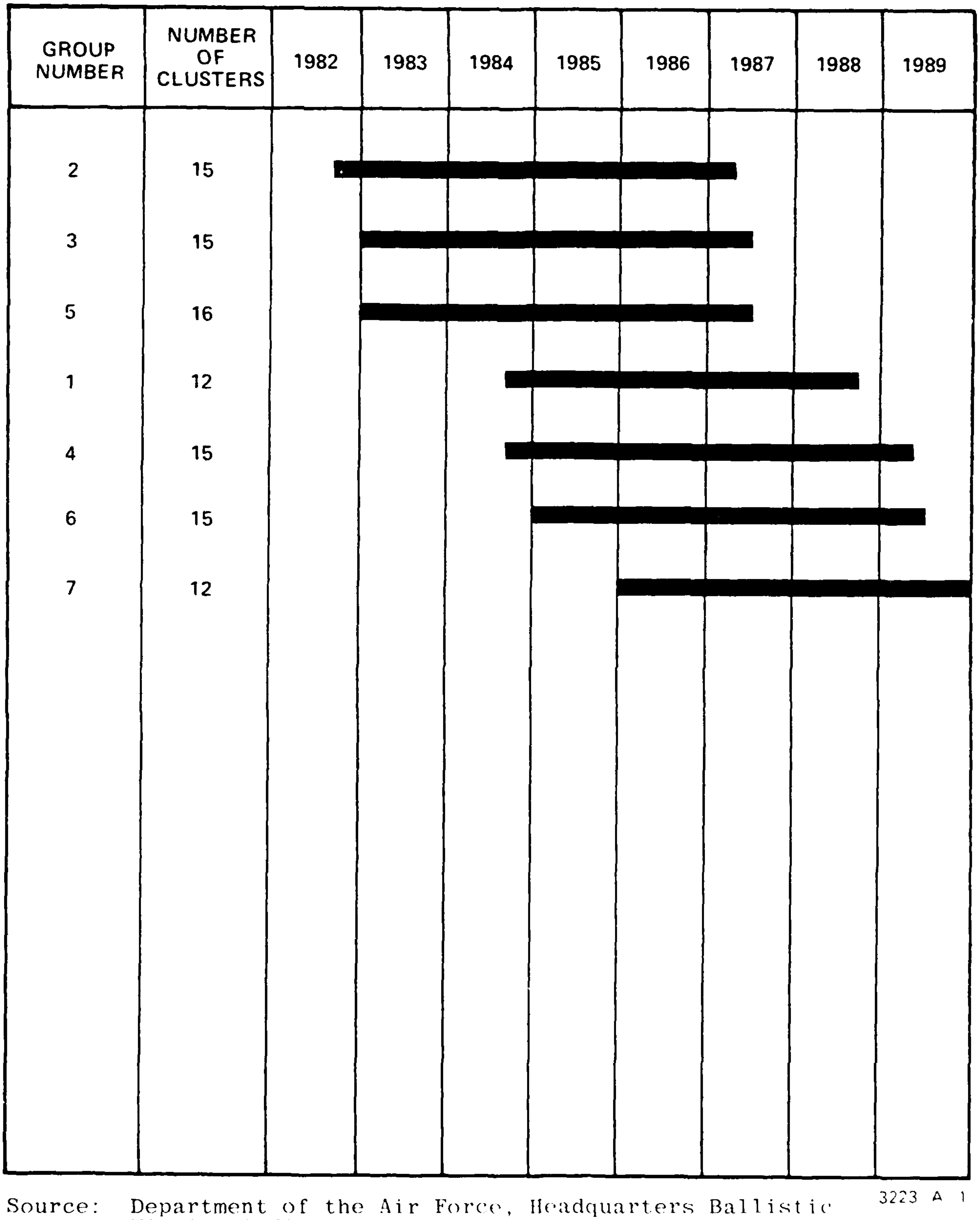
Figure E.2.2-1. DDA construction schedule for portion of Alternative 8, split deployment, Nevada/ Utah.



Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Figure E.2.2-2. DDA construction schedule for portion of Alternative 8, split deployment, Texas/New Mexico.

Table E.3-1. Average direct personnel requirements for DDA and OB facilities for portion of Alternative 8, split deployment, Nevada/Utah, 1981-1991.

	Personnel										
Description	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Onsite											
Construction											
DDA[1]	0	297	1,306	3,338	8,053	7,682	7,069	5,347	2,037	0	0
OB Complex[2]	0	1,392	2,936	2,762	2,618	1,565	1,052	0	0	0	0
Subtotal	0	1,689	4,242	6,100	10,671	9,247	8,121	5,347	2,037	0	0
A&CO											
DDA[1]	0	10	100	300	1,250	3,630	3,052	3,091	2,790	70	0
OB Complex[2]	0	50	200	500	900	1,130	880	880	880	178	0
Subtotal	0	60	300	800	2,150	4,760	3,932	3,971	3,670	248	0
Operations											
OB Complex[2]	0	0	39	234	2,611	6,247	8,354	8,354	8,354	8,354	8,354
Total Onsite	0	1,749	4,581	7,134	15,432	20,254	20,407	17,672	14,061	8,602	8,354
Offsite											
Construction											
Salt Lake City	48	130	217	256	256	256	256	188	63	63	0
A&CO											
Las Vegas	30	216	450	500	245	150	150	150	150	75	0
Total Offsite	78	346	667	756	501	406	406	338	213	138	0
Grand Total	78	2,095	5,248	7,890	15,933	20,660	20,813	18,010	14,274	8,740	8,354

15056/10-2-81/6

[1]DDA includes PS, ASC, DTN, CMF, RSS, and CR.

[2]OB complex includes OB, DAA, OBTS, and airfield.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table E.3-2. Average direct personnel requirements for DDA and OB facilities for portion of Alternative 8, split deployment, Texas/New Mexico, 1981-1991.

Description	Personnel										
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Onsite/Location											
Construction											
DDA[1]		71	1,490	2,380	6,857	8,524	6,836	5,720	2,127		
OB Complex[2]		1,392	2,755	2,762	2,618	1,565	1,052				
Subtotal		1,463	4,245	5,142	9,475	10,089	7,888	5,720	2,127		
A&CO											
DDA[1]		5	50	150	300	2,420	3,468	3,510	3,210	80	
OB Complex[2]		25	100	250	450	750	1,050	1,000	1,000	202	
Subtotal		30	150	400	750	3,170	4,518	4,510	4,210	282	
Operations											
OB Complex[2]					31	246	2,216	4,849	5,992	5,992	5,992
Total Onsite		1,493	4,395	5,542	10,256	13,505	14,622	15,079	12,329	6,274	5,992
Offsite/Location											
Construction											
Clovis	48	130	217	256	256	256	256	188	63	63	
A&CO											
Amarillo		160	300	400	205	150	150	150	150	75	
Total Offsite	48	290	517	656	461	406	406	338	213	138	
Grand Total	48	1,783	4,912	6,198	10,717	13,911	15,028	15,417	12,542	6,412	5,992

T5495/9-17-81/F

[1] DDA includes PS, ASC, DTN, CMF, RSS, and CR.

[2] OB complex includes OB, DAA, and airfield.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table E.3-3. Average direct construction personnel requirements for DDA and OB facilities for portion of Alternative 8, split deployment, Nevada/Utah, 1981-1990.

	Construction Personnel									
Group Number[1]	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Onsite										
1		297	528	455	1,818	521				
2			379	869	1,869	1,021				
3			399	768	1,939	1,428				
4				447	1,005	1,867	1,813	347		
5				304	534	892	1,701	195		
6				495	888	1,232	2,020	1,083		
7						431	965	1,883	1,523	
8						290	570	1,839	514	
Subtotal DDA		297	1,306	3,338	8,053	7,682	7,069	5,347	2,037	
OB Complex[2]		1,392	2,936	2,762	2,618	1,565	1,052			
Total Onsite		1,689	4,242	6,100	10,671	9,247	8,121	5,347	2,037	
Salt Lake City	48	130	217	256	256	256	256	188	63	63
Offsite										
Grand Total	48	1,819	4,459	6,356	10,927	9,503	8,377	5,535	2,100	63

T5496/10-2-81/F/a

[1]See Figures E.2-1 and E.2.2-1.

[2]See Figure A.2.1-1.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table E.3-4. Average direct construction personnel requirements for DDA and OB facilities for portion of Alternative 8, split deployment, Texas/New Mexico, 1981-1990.

	Construction Personnel									
Group Number[1]	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Onsite										
1				58	477	854	1,873	830		
2		71	573	669	1,886	1,797	144			
3			444	765	1,662	1,823	308			
4				71	573	669	1,886	1,659	144	
5			473	817	1,817	2,253	316			
6					442	766	1,805	1,761	228	
7						362	504	1,470	1,755	
Subtotal DDA		71	1,490	2,380	6,857	8,524	6,836	5,720	2,127	
OB Complex[2]		1,392	2,755	2,762	2,618	1,565	1,052			
Total Onsite		1,463	4,245	5,142	9,475	10,089	7,888	5,720	2,127	
Offsite										
Clovis	48	130	217	256	256	256	256	188	63	63
Grand Total	48	1,593	4,462	5,398	9,731	10,345	8,144	5,908	2,190	63

T5497/10-2-81/F/a

[1] See Figures E.2-2 and E.2.2-2.

[2] See Figure E.2.1-1.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table E.3-5. Average A & CO personnel requirements for DDA and OB facilities for portion of Alternative 8, split deployment, Nevada/Utah, 1981-1990.

Group Number[1]	A&CO Personnel									
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Onsite/Location										
1		10	100	150	1,050	1,277				
2				100	100	1,715				
3				50	100	480	1,032			
4						71	1,301	715		
5						37	613	706		
6						50	97	1,458	349	
7							9	106	1,395	70
8								106	1,046	
Subtotal DDA		10	100	300	1,250	3,630	3,052	3,091	2,790	70
OB Complex[2]		50	200	500	900	1,130	880	880	880	178
Total Onsite		60	300	800	2,150	4,760	3,932	3,971	3,670	248
Offsite/Location										
Las Vegas	30	216	450	500	245	150	150	150	150	75
Grand Total	30	276	750	1,300	2,395	4,910	4,082	4,121	3,820	323

T5498/9-17-81/F

[1] See Figures E.2-1 and E.2.2-1.
[2] See Figure A.2.1-1.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table E.3-6. Average A & CO personnel requirements for DDA and OB facilities for portion of Alternative 8, split deployment, Texas/New Mexico, 1982-1990.

Group Number[1]	A&CO Personnel								
	1982	1983	1984	1985	1986	1987	1988	1989	1990
Onsite/Location									
1					15	90	1,557		
2	5	50	150	109	2,215	559			
3				91	95	1,133	378		
4						90	1,417	402	
5				100	95	1,513			
6						83	95	1,404	
7							63	1,404	80
Subtotal DDA	5	50	150	300	2,420	3,468	3,510	3,210	80
OB Complex[2]	25	100	250	450	750	1,050	1,000	1,000	202
Total Onsite	30	150	400	750	3,170	4,518	4,510	4,210	282
Offsite/Location									
Amarillo	160	300	400	205	150	150	150	150	75
Grand Total	190	450	800	955	3,320	4,668	4,660	4,360	357

T5499/9-20-81/F

[1] See Figures E.2-2 and E.2.2-2.

[2] See Figure E.2.1-1.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table E.3-7. Average operations personnel requirements for OB facilities for portion of Alternative 8, split deployment, Nevada/Utah, 1983-1989.

Employment Type	Operations Personnel						
	1983	1984	1985	1986	1987	1988	1989
OB Complex							
Officer	10	34	224	587	736	736	736
Enlisted	27	148	1,907	4,804	6,398	6,398	6,398
Civilian	2	52	480	856	1,220	1,220	1,220
Total	39	234	2,611	6,247	8,354	8,354	8,354

T5059/10-2-81/F

Note: Operations employment will continue at 1989 levels throughout the operating life of the project.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table E.3-8. Average operations personnel requirements for OB facilities for portion of Alternative 8, split deployment, Texas/New Mexico, 1985-1989.

Employment Type	Operations Personnel				
	1985	1986	1987	1988	1989
OB Complex					
Officer	5	12	172	291	316
Enlisted	24	170	1,777	3,739	4,646
Civilian	2	64	267	819	1,030
Total	31	246	2,216	4,849	5,992

T5063/10-2-81/F

Note: Operations employment will continue at 1989 levels throughout the operating life of the project.

Source: Department of the Air Force, Headquarters Ballistic Missile Office (AFSC), 28 April 1981.

Table E.3-9. Total construction resources for DDA and OB facilities for portion of Alternative 8, split deployment, Nevada/Utah, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	1,848	8,196	17,126	23,958	7,914	15,695	4,840	2,245
Cumulative	1,848	10,044	27,170	51,128	59,042	74,737	79,577	81,822
Disturbed Area (acres)[2]								
Incremental	2,051	7,987	15,449	23,310	9,261	15,975	6,073	2,853
Cumulative	2,051	10,038	25,487	48,797	58,058	74,033	80,106	82,959
Steel (tons)								
Incremental	369	779	3,322	40,615	45,264	45,940	42,485	19,996
Cumulative	369	1,148	4,470	45,085	90,349	136,289	178,774	198,770
Concrete (cu yd*1,000)								
Incremental	63	133	144	412	400	383	312	147
Cumulative	63	196	340	752	1,152	1,535	1,847	1,99[illegible]
Asphalt (tons*1,000)								
Incremental	495	1,001	1,592	125	740	50		
Cumulative	495	1,496	3,088	3,213	3,953	4,003		

T3318/9-13-81/F

Table E.3-9. Total construction resources for DDA and OB facilities for portion of Alternative 8, split deployment, Nevada/Utah, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	612	3,138	6,674	8,174	905	4,447		
Cumulative	612	3,750	10,424	18,598	19,503	23,950		
Prime Coat (tons)								
Incremental	2,140	4,360	6,481	1,083	3,079	435		
Cumulative	2,140	6,500	12,981	14,064	17,143	17,578		
Fencing (lin ft*1,000)								
Incremental	8	16	56	649	722	732	677	318
Cumulative	8	24	80	729	1,451	2,183	2,860	3,178

T3318/9-13-81/F

[1]Does not include A&CO or operations domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

Table E.3-10. Total construction resources for DDA and OB facilities for portion of Alternative 8, split deployment, Texas/New Mexico, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	5,147	18,677	8,810	24,301	9,676	8,231	3,282	357
Cumulative	5,147	23,824	32,634	56,935	66,611	74,842	78,124	78,481
Disturbed Area (acres)[2]								
Incremental	4,651	17,027	9,556	24,065	10,884	9,657	3,926	282
Cumulative	4,651	21,678	31,234	55,299	66,183	75,840	79,766	80,048
Steel (tons)								
Incremental	338	669	23,660	50,591	44,790	48,914	27,465	2,023
Cumulative	338	1,007	24,667	75,258	120,048	168,962	196,427	198,450
Concrete (cu yd*1,000)								
Incremental	64	127	296	488	398	406	202	14
Cumulative	64	191	487	975	1,373	1,779	1,981	1,995
Asphalt (tons*1,000)								
Incremental	1,497	313	1,075	523	144	51		
Cumulative	1,497	1,810	2,885	3,408	3,552	3,603		

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Table E.3-10. Total construction resources for DDA and OB facilities for portion of Alternative 8, split deployment, Texas/New Mexico, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity Per Year 1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	1,788	7,856	2,320	7,804	1,820	1,092		
Cumulative	1,788	9,644	11,964	19,768	21,588	22,680		
Prime Coat (tons)								
Incremental	5,811	1,811	4,600	2,546	907	442		
Cumulative	5,811	7,622	12,222	14,768	15,675	16,117		
Fencing (lin ft*1,000)								
Incremental	7	14	380	809	714	779	437	32
Cumulative	7	21	401	1,210	1,924	2,703	3,140	3,172

T3324/9-13-81/F

[1]Does not include A&CO or operations domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

Table E.3.1-1. Total OB complex construction resources for portion of Alternative 8, split deployment, Nevada/Utah, 1982-1987.

Construction Resources	Quantity Per Year					
	1982	1983	1984	1985	1986	1987
Water (acre-ft)[1]						
Incremental	410	866	814	773	462	310
Cumulative	410	1,276	2,090	2,863	3,325	3,635
Disturbed Area (acres)[2]						
Incremental	942	1,987	1,869	1,772	1,059	712
Cumulative	942	2,929	4,798	6,570	7,629	8,341
Steel (tons)						
Incremental	369	779	733	695	415	279
Cumulative	369	1,148	1,881	2,576	2,991	3,270
Concrete (cu yd*1,000)						
Incremental	63	133	125	119	71	48
Cumulative	63	196	321	440	511	559
Asphalt (tons*1,000)						
Incremental	67	141	132	125	75	50
Cumulative	67	208	340	465	540	590
Aggregate (cu yd*1,000)						
Incremental	110	231	217	206	123	83
Cumulative	110	341	558	764	887	970
Prime Coat (tons)						
Incremental	576	1,215	1,143	1,083	648	435
Cumulative	576	1,791	2,934	4,017	4,665	5,100
Fencing (lin ft*1,000)						
Incremental	8	16	15	14	9	6
Cumulative	8	24	39	53	62	68

T3314/9-13-81/F

[1]Does not include A&CO or operations domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

Table E.3.1-2. Total OB complex construction resources for portion of Alternative 8, split deployment, Texas/New Mexico, 1982-1987.

Construction Resources	Quantity Per Year					
	1982	1983	1984	1985	1986	1987
Water (acre-ft)[1]						
Incremental	403	800	801	760	454	305
Cumulative	403	1,203	2,004	2,764	3,218	3,523
Disturbed area (acres)[2]						
Incremental	927	1,835	1,840	1,744	1,043	701
Cumulative	927	2,762	4,602	6,346	7,389	8,090
Steel (tons)						
Incremental	338	669	671	636	380	256
Cumulative	338	1,007	1,678	2,314	2,694	2,950
Concrete (cu yd*1,000)						
Incremental	64	127	127	121	72	49
Cumulative	64	191	318	439	511	560
Asphalt (tons*1,000)						
Incremental	68	134	134	127	76	51
Cumulative	68	202	336	463	539	590
Aggregate (cu yd*1,000)						
Incremental	110	218	218	207	124	83
Cumulative	110	328	546	753	877	960
Prime Coat (tons)						
Incremental	585	1,157	1,160	1,099	657	442
Cumulative	585	1,742	2,902	4,001	4,658	5,100
Fencing (lin ft*1,000)						
Incremental	-	14	14	14	8	5
Cumulative	7	21	35	49	57	62

T3321/9-13-81/F

[1]Does not include A&CO or operations domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

DDA (E.3.2)

The total resource requirements for the DDA construction in Nevada/Utah and in Texas/New Mexico are shown in Tables E.3.2-1 and E.3.2-2, respectively. See the general discussion of the total construction resources at the beginning of subsection A.3 in Appendix A. Except for building construction, the comments also apply to DDA construction.

Requirements for certain resources, such as concrete and steel, are the same for Alternative 8 (Nevada/Utah and Texas/New Mexico) and the full deployment alternatives. This is because these resources are used in the construction of the protective shelters, and both the full and split deployment systems have the same total number of shelters, 4,600. Requirements for other resources, such as aggregate, vary between the two deployment systems because the total length of road systems are different.

Table E.3.2-1. Total DDA construction resources for portion of Alternative 8, split deployment, Nevada/Utah, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	1,438	7,330	16,312	23,185	7,452	15,385	4,840	2,245
Cumulative	1,438	8,768	25,080	48,265	55,717	71,102	75,942	78,187
Disturbed Area (acres)[2]								
Incremental	1,109	6,000	13,580	21,538	8,202	15,263	6,073	2,853
Cumulative	1,109	7,109	20,689	42,227	50,429	65,692	71,765	74,618
Steel (tons)								
Incremental			2,589	39,920	44,849	45,661	42,485	19,996
Cumulative			2,589	42,509	87,358	133,019	175,504	195,500
Concrete (cu yd*1,000)								
Incremental			19	293	329	335	312	147
Cumulative			19	312	641	976	1,288	1,435
Asphalt (tons*1,000)								
Incremental	428	860	1,460	0	665			
Cumulative	428	1,288	2,748	2,748	3,413			

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Table E.3.2-1. Total DDA construction resources for portion of Alternative 8, split deployment, Nevada/Utah, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity Per Year 1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	502	2,907	6,457	7,968	782	4,364		
Cumulative	502	3,409	9,866	17,834	18,616	22,980		
Prime Coat (tons)								
Incremental	1,564	3,145	5,338	0	2,431			
Cumulative	1,564	4,709	10,047	10,047	12,478			
Fencing (lin f**1,000)								
Incremental			41	635	713	726	677	318
Cumulative			41	676	1,389	2,115	2,792	3,110
Protective Shelters								
Incremental			30	470	528	537	500	235
Cumulative			30	500	1,028	1,565	2,065	2,300
Mi of DTN								
Incremental	92	185	314	0	143			
Cumulative	92	277	591	591	734			
Mi of Cluster Roads								
Incremental		310	775	1,302	0	713		
Cumulative		310	1,085	2,387	2,387	3,100		

T4003/9-13-81/F

[1]Does not include A&CO domestic uses.

[2]Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

Table E.3.2-2. Total DDA construction resources for portion of Alternative 8, split deployment, Texas/New Mexico, 1982-1989 (Page 1 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Water (acre-ft)[1]								
Incremental	4,744	17,877	8,009	23,541	9,222	7,926	3,282	357
Cumulative	4,744	22,621	30,630	54,171	63,393	71,319	74,601	74,958
Disturbed Area (acres)[2]								
Incremental	3,724	15,192	7,716	22,321	9,841	8,956	3,926	282
Cumulative	3,724	18,916	26,632	48,953	58,794	67,750	71,676	71,958
Steel (tons)								
Incremental			22,989	49,955	44,410	48,658	27,465	2,023
Cumulative			22,289	72,944	117,354	166,012	193,477	195,500
Concrete (cu yd*1,000)								
Incremental			169	367	326	357	202	14
Cumulative			169	536	862	1,219	1,421	1,435
Asphalt (tons*1,000)								
Incremental	1,429	179	941	396	68			
Cumulative	1,429	1,608	2,549	2,945	3,013			

T4002/9-13-81/F

Table E.3.2-2. Total DDA construction resources for portion of Alternative 8, split deployment, Texas/New Mexico, 1982-1989 (Page 2 of 2).

Construction Resources	Quantity Per Year							
	1982	1983	1984	1985	1986	1987	1988	1989
Aggregate (cu yd*1,000)								
Incremental	1,678	7,638	2,102	7,597	1,696	1,009		
Cumulative	1,678	9,316	11,418	19,015	20,711	21,720		
Prime Coat (tons)								
Incremental	5,226	654	3,440	1,447	250			
Cumulative	5,226	5,880	9,320	10,767	11,017			
Fencing (lin ft*1,000)								
Incremental			366	795	706	774	437	32
Cumulative			366	1,161	1,867	2,641	3,078	3,110
Protective Shelters								
Incremental			270	588	522	572	324	24
Cumulative			270	858	1,380	1,952	2,276	2,300
Mi of DTN								
Incremental	307	38	202	85	16			
Cumulative	307	345	547	632	648			
Mi of Cluster Roads								
Incremental		1,214	163	1,165	264	165		
Cumulative		1,214	1,377	2,542	2,806	2,971		

T4002/9-13-81/F

[1] Does not include A&CO domestic uses.

[2] Does not include temporary disturbances.

Source: Department of the Air Force and HDR Sciences, 1981.

APPENDIX F LATEST DESIGN OF M-X SYSTEM FACILITIES

F.1 INTRODUCTION

As stated in previous sections of this ETR, the analysis used in this FEIS is based upon the preliminary designs and system layouts that were valid at the time of analysis. These designs and layouts are by no means final, and will go through further modifications and refinements. For additional discussion of the ongoing design changes, see Section 1 of Chapter 1 of this FEIS.

F.2 SUMMARY

To illustrate the design development that has taken place, the following is a description of the latest design as it applies to the Proposed Action. The system configuration and corresponding construction material quantities were developed in July and August of 1981, based upon the latest available information.

SYSTEM CONFIGURATION (F.2.1)

The system configuration is the design, as of July 1981. It consists of a first and second OB, a DAA, and an OBTS (which are referred to as the OB complexes in the FEIS), and a DDA.

The first OB is designed for an operations population of 7,730 (same as in FEIS), requiring an area of 5,400 acres (6,140 acres in FEIS). Within the required area are 171 technical and nontechnical facilities, 4,200 homes, 55 mi of roads, and one airfield. The second OB is designed for an operations population of 5,600 (same as in FEIS), requiring an area of 3,500 acres (4,240 acres in FEIS). Within the required area are 142 technical and nontechnical facilities, 2,915 homes, 45 mi of roads, and one airfield.

The DAA requires 1,980 acres (1,950 acres in FEIS), and contains 75 technical and nontechnical facilities, 33.5 mi of roads, and 40 mi of railroad.

The OBTS area requirement has not been defined; but it does contain 11.2 mi of roads, one training support building, one CMF, and five protective shelters.

The DDA area requirement also has not been defined. The DDA contains 4,600 shelters (same as in FEIS), 200 CMFs (same as in FEIS), 2,300 extended range radars (replacement for 200 RSSs in FEIS), and four ASCs (same as in FEIS). The length of roads differ significantly between the latest design and the FEIS. The latest design shows a total of 1,203 mi of DTN which is composed of 1,113 mi of new roads and 90 mi of upgraded state highways. The FEIS has approximately 1,460 mi of DTN. There are 5,198 mi of cluster roads required for the latest design, whereas the FEIS has approximately 6,200 mi. The latest design shows 512 mi of access roads and 720 mi of CREV roads, the total of which (1,232 mi) is comparable with the 1,320 mi of support roads in the FEIS.

There are also some ongoing changes in the land requirements for temporary construction facilities. Table F.2.1-1 presents the latest requirements.

Table F.2.1-1. Land requirements for temporary construction facilities.[1]

Description	Number or Length in Miles	Unit Area	Total Area (Acres)
Construction Camps[4]	16-20	175 acres/each	2,800-3,500
Precast Concrete Plants & Storage areas	16-20	320 acres/each	5,120-6,400
Material Source Points[2]	230-270	20 acres/each	4,600-5,400
Water Wells	150-310	1 acre/each	150-310
Marshalling Yards	3-5	650 acres/each	1,950-3,250
Construction Roads[3]	250-350	9 acres/mile	2,250-3,150
Contractor Support Yards	16-20	320 acres/each	5,120-6,400
Total			21,990-28,410

T5918/9-24-81/F

[1]This provides a range for all deployment alternatives.

[2]Includes plants and quarries.

[3]Roads to material sources.

[4]Camp size assumes no dependents, 50 percent of workers housed in surrounding communities.

Source: Corps of Engineers, 1981.

CONSTRUCTION RESOURCES (F.2.2)

The following tables show a comparison of the construction resources required for the Proposed Action by the latest design described above and the FEIS. The quantities for the latest design do not include those associated with temporary items, such as construction camps, or construction overruns. There is a variance between the latest design quantity and the FEIS range of quantity for two reasons:

- the system configuration has changed (such as the length of the DTN)
- the design of a particular facility has changed (such as the protective shelter components).

The latest road design shows a total of 1,203 mi of DTN which is composed of 1,113 mi of new roads and 90 mi of upgraded state highways. The FEIS shows approximately 1,460 mi of DTN. There are 5,198 mi of cluster roads for the latest design, whereas the FEIS has approximately 6,200 mi. The latest design shows 512 mi of access roads and 720 mi of CREV roads, the total of which (1,232 mi) is comparable with the 1,320 mi of support roads in the FEIS. Table F.2.2-1 defines the significant cross sections which have contributed to changes in the amount of aggregate required.

The significant change affecting horizontal shelter construction resources is the thickness of the steel liner which has increased from 1/4 to 3/8 in. The following table gives the approximate dimensions for this facility:

Length	171 ft 3 in.
Inside diameter	14 ft 6 in.
Wall thickness	1 ft 9 in.
Steel liner	161 ft long x 3/8 in. thick

The main components of the shelter concrete mix are as follows:

Concrete Mix: (719 cu yd/shelter)

Cement	646 lb/cu yd
Fly ash	186 lb/cu yd
Aggregate	1,745 lb/cu yd
Sand	1,171 lb/cu yd
Water	40 gal/cu yd

The Cluster Maintenance Facility (CMF) conceptual design has been greatly revised since publication of the DEIS and now employs a loading dock. Estimated total for the 200 structures is 28,000 tons of steel and 166,000 cu yd of concrete.

Table F.2.2-2 shows a summary comparison of the major construction resources required for the Proposed Action. Table F.2.2-3 is also a comparison of major construction resources required for the Proposed Action, showing a breakdown for the OB complexes and the DDA.

The water number shown for the latest design uses the same construction, domestic, and revegetation rates as the FEIS and includes all those uses. The water

Table F.2.2-1. Road design as of July 1981.

Road	Width (ft)	Cross Section Thickness (in.)			
		Subgrade	Subbase	Base	Asphaltic Surface
DTN	24	18	8	6	5
Cluster	21	6	0	6 or 19[1]	0
Access	20	6	0	6	0
CREV	10	6	0	0	0

T5388/10-2-81

[1] 80 percent of cluster roads will be 6 in. and 20 percent will be 19 in. Total thickness is made up of 30 percent gravel and 70 percent select soil.

Source: HDR Sciences and TRW calculation.

Table F.2.2-2. Summary comparison of construction resources for Proposed Action.

Construction Resources	Quantity	
	Latest Design	FEIS
Water (x 10^3 acre-ft)	143	86-186[1]
Aggregate (x 10^3 tons)	50,688	95,978-117,307
Steel (x 10^3 tons)	873	376-416
Cement (x 10^3 tons)	1,213	1,446-1,598
Fly Ash (x 10^3 tons)	359	307-339
Lumber (x 10^3 board-ft)	46,795	40,733-45,021
Asphaltic Oil (x 10^3 gal)	83,554	123,087-150,588
Select Soil (x 10^3 tons)	26,845	0
Dust Suppressant (x 10^3 gal)	63,538	N/A
POL[2] (x 10^6 gal)	-	459-561
Electrical Energy[2] (x 10^3 MWh)	-	3,226-3,942

T5116/9-24-81/F

[1]Low number is with no vegetation; high number is with revegetation of 9 in. on 100,000 acres.

[2]No quantities were calculated for the latest design for either POL (petroleum, oil, and lubricant) or electrical energy.

Source: HDR Sciences and TRW, 1981.

Table F.2.2-3. Comparison of construction resources for OB complexes and DDA for Proposed Action.

Construction Resources	Quantity			
	OB Complexes		DDA	
	Latest Design	FEIS	Latest Design	FEIS
Water ($\times 10^3$ acre-ft)	12	4-7	131	82-179[1]
Aggregate ($\times 10^3$ tons)	5,226	4,641-5,894	45,462	91,337-111,413
Steel ($\times 10^3$ tons)	27	4-6	846	372-410
Cement ($\times 10^3$ tons)	104	395-437	1,109	1,051-1,161
Fly Ash ($\times 10^3$ tons)	36	64-70	323	243-269
Lumber ($\times 10^3$ board-ft)	44,299	39,000-43,106	2,496	1,733-1,915
Asphaltic Oil ($\times 10^3$ gal)	11,641	19,419-23,809	71,913	103,668-126,779

T5117/9-13-81/F

[1]Low number is with no revegetation; high number is with revegetation of 9 in. on 100,000 acres.

Source: HDR Sciences and TRW, 1981.

quality range shown for the FEIS consists of a low number, which includes no revegetation, and a high number, which includes revegetation of 9 in. on 100,000 acres (75,000 acre-ft). Although the latest design falls within the range of the FEIS, the numbers still vary because of different designs (shelters, road sections) and different system configurations (length of roads, OB areas).

The aggregate range shown for the FEIS has been converted from cu yd (see Table 1.2-5 in Section 1 of this ETR) to tons, so that it can be compared to the latest design. The aggregate unit weight used in this conversion was 145 lb/cu ft. The reasons for the large variance between the latest design and the FEIS are the same as discussed for the water numbers above.

The major use of steel, cement, and fly ash is in the construction of the protective shelter. Steel is used for reinforcing, shelter liners, and sheet pile retaining walls. Cement and fly ash are components of concrete. The primary reason for the deviations of these quantities between the latest design and the FEIS is that the design of the shelter and its components is different.

Lumber is used primarily in the construction of buildings at the OBs. Although the number shown for the latest design does not fall within the range shown for the FEIS, it is very close. The date of the latest design for the OBs is July, 1981. The date of the design for the OBs for the FEIS is January, 1980, with revisions made in September, 1980. These two designs do not disagree significantly, hence the rather small difference in the lumber quantities.

The asphaltic oil range shown for the FEIS quantity has been converted from tons (see Table 1.2-5 in Section 1 of this ETR) to gal, so that it can be compared to the latest design. The asphaltic oil unit volume used in this conversion was 267 gal/ton. The asphaltic oil is used with aggregate to form the surface used for DTN. The reasons for the large variation between the latest design and the FEIS are that both the DTN section and length are different.

Select soil is a material that is primarily used in road construction. The latest design now uses it to replace some of the aggregate. Since this was not a required road material for the FEIS design, no quantity was calculated, and no comparison can be made.

The dust suppressant (palliative) used in the FEIS was a mixture of 50 percent asphaltic oil and 50 percent water, called an emulsified asphalt. Quantities of asphaltic oil and water required for dust control were calculated and are included in the quantities of those two resources.

APPENDIX G CONSTRUCTION MANPOWER ESTIMATES BY TASK FORCE I AND TASK FORCE II

CONSTRUCTION MANPOWER ESTIMATES

BY

TASK FORCE I

AND

TASK FORCE II

25 AUGUST 1981

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INTRODUCTION

1. This report outlines and summarizes the work of two M-X construction manpower estimating teams commonly referred to as Task Force I and Task Force II. M-X construction manpower estimates are of major concern to government agencies and contractors associated with the system's construction and deployment. Many of the impacts on human and natural resources addressed in the Deployment Area Selection and Land Withdrawal/Acquisition Enviromental Impact Statement (EIS) are directly or indirectly affected by manpower estimates. Similarly, accurate budget and construction estimates for life support systems for construction and assembly and checkout personnel (A&CO) are related to these manpower estimates. Providing timely and suitable life support systems is a critical phase in this project because of the sparsely populated nature of the deployment area in question.

2. Task Force I consisted of Air Force, Corps of Engineers and Air Force contractor manpower estimating engineers which were assembled in November, 1980 to compute the manpower required to build the facilities associated with the M-X System. The team used the latest studies and cost estimates to more accurately refine previous manpower estimates for the Proposed Action as discussed in the Deployment Area Selection and Land Withdrawal/Acquistion Draft Environmental Impact Statement (DEIS). The Results of the Task Force I effort are contained in Chapter I.

3. Chapters 2 through 5 illustrate the efforts of Task Force II which met in March, 1981. The team members were nearly the same as in Task Force I. The purpose of the Task Force in this case was to extrapolate from and transform the detailed month by month estimates from Task Force I to annual averages distributed over time and construction zones. Annual averages were required to revise

the environmental impacts for all deployment alternatives addressed in the EIS. Updated A&CO and operational manpower estimates were also incorporated into the total estimate at this time. In addition to the manpower estimates, the construction schedules were also updated to provide for more efficient construction phasing and to insure that A&CO and communication systems installation could follow facility construction in a more acceptable and efficient manner. The schedule changes essentially transformed the construction scenario from a multiple front approach to a "tree" approach with construction beginning near the first operating base and fanning out to the second base on to the system's outer boundaries.

4. The reader should note that these estimates were based upon the best information available during their development. When data gaps were revealed, the team had to make assumptions regarding construction techniques and materials. Many of these assumptions may have to be changed as new data becomes available during the construction phase. For an example, during the manpower estimating period the Air Force had ongoing contracts to optimize shelter construction techniques and provide for optimal base layouts. The results of these efforts may significantly affect these estimates. Additionally, as the M-X system planning process continues, there will be system refinements and technological advances which may reduce facility requirements. However, unforseen climatological, geological or geotechnical difficulities may well increase the manpower requirements. In the light of the foregoing and considering this was a corporate effort looking at an instant in time of an extremely dynamic program, these estimates represent the most accurate manpower projections associated with M-X facility construction.

CHAPTER 1
Initial Task Force Construction Manpower Estimates

Between 5 November 1980 and 13 November 1980, a Task Force of Air Force, Corps of Engineers, and Air Force contractor personnel was organized to resolve the discrepancy between the manpower estimates derived by the Corps (Life Support Working Group) for the total construction force and those derived for use in the DEIS. Contractor personnel were from Ralph M. Parsons Co. (RMP) and Henningson, Durham and Richardson Sciences (HDR). A list of the Task Force participants is included as Table 1-1.

1. The RMP estimate of October 1980, Air Force Contract No. F04704-C-C 0054, was used for the Designated Deployment Area (DDA) and it was decided to use this "brick and mortar" estimate as the basis for the entire effort. Using this basis, best estimates were then made for the remainder of the program; i.e., Operating Bases, Electrical Distribution System, Designated Assembly Area (DAA), Operating Base Test Site (OBTS) and other elements not included in RMP's DDA estimates. In essence, The basis of the manpower figures derived for each portion of the program was as follows:

A. DDA: RMP's firm estimate consisting of detailed labor, material, and equipment by specific task as submitted to the Air Force.

B. DAA, OBTS and Operating Bases:

(1) Based upon the individuals' experiences and Dept of Labor Data, an extrapolated multiplier of 27 manhours per $1000(FY78) of constructed value was judged to be reasonable and used to derive the estimated manpower.

(2) Budget figures for FY82 were used along with figures from programming documents and estimates by Headquarters SAC.

C. Electrical Distribution System:

(1) Using information from the Corps of Engineers, TRW Corporation (TRW) and the Systems Design Review, a system design concept was developed and an estimate was made using these data.

(2) Again, based upon the individuals' experience and Dept of Labor data, an extrapolated multiplier of 22 manhours per $1000(FY78) of constructed value was judged to be reasonable and was used to derive the estimated manpower.

(3) For the substations which will largely arrive as manufactured items, 50% of the labor was assumed to occur outside the deployment area, and was not included in the manpower requirements.

2. Corps of Engineers manpower requirements (i.e., government employees) were assumed to be 10% of the construction manpower requirements and a contingency of 12% was added to cover uncertainties.

3. Since life support figures were included in RMP's estimate and the resulting multipliers derived from that basis, the construction manpower numbers derived include life support personnel.

4. The basis of the labor distribution within the extrapolated program was the following.

A. The nature and location of the task was used to determine the affect of prevailing weather conditions on construction scheduling.

B. The distribution of manpower over time was based upon experience with construction typical of that being estimated. Specifically, the OB's/DAA labor was spread over 6 quarters beginning in January of the respective fiscal years. Approximately 40% of the labor is estimated to occur in the first 3 quarters and 60% in the last 3 quarters.

5. Basically, the above scenario was developed using the following assumptions:

A. Proposed basing mode in Utah and Nevada with Coyote Spring/Milford as operating bases (Proposed action in DEIS).

B. Division of the DAA into 18 construction areas as depicted in Figure 1-2 (Figure 5-3 of RMP's report).

C. Precast shelters with the accompanying support contracts, etc, as depicted in Figure 1-3 (Figure 5-4 of RMP's report).

D. DAA, OBTS and Designated Transportation Network (DTN) construction beginning in FY 82 and continuing as programmed.

6. At the conclusion of the above exercise, the Task Force Development Work Force Histogram was produced (Figure 1-4; RMP, letter dated 16 Dec 81) and a Corps of Engineers' letter dated 14 November 1980 (Figure 1-5) was sent to the Air Force comparing those estimates with estimates derived by three other groups.

TASK FORCE PARTICIPANTS

(5 Nov to 13 Nov 1980)

Name	Organization	Phone No.
Jerry Eide	RMP	(213) 440-3338
Ron Galletti	RMP	(213) 440-2048
Gene Shy	Corps of Engineers	(916) 440-2576
Capt Paul Dolter	Air Force	(714) 382-3804
Lew Krug	HDR	(805) 965-5214
Jerry Kelly	RMP	(213) 440-4929
*Ken Parkinson	Corps of Engineers	(916) 440-2474
*Fran Campbell	Corps of Engineers	(916) 440-2474

*Part time

Table 1-1

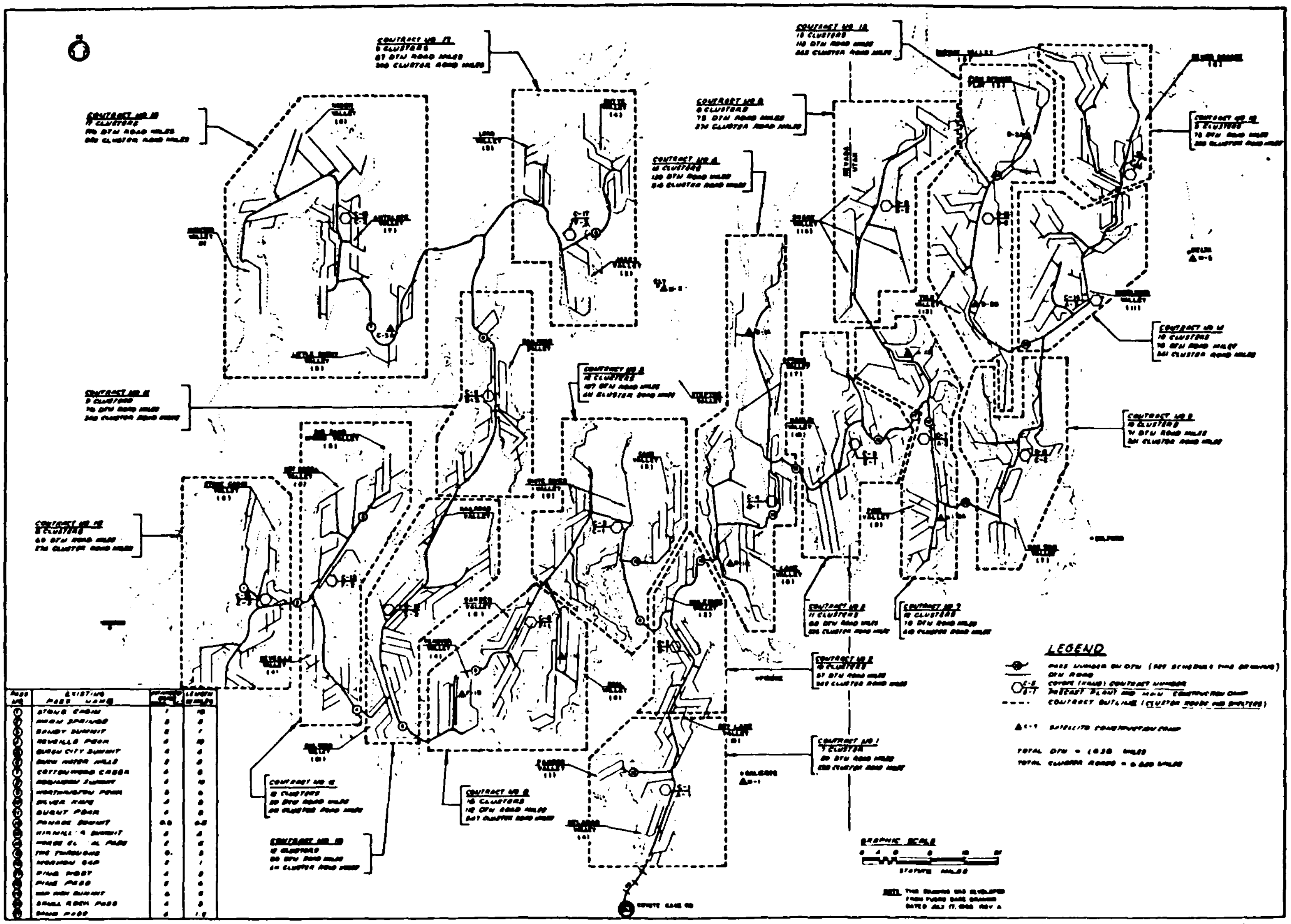


Figure 5-3 - Locations and Contract Areas for Main and Satellite Construction Camps, Cluster Roads, and Precast Plants

FIGURE 1-2

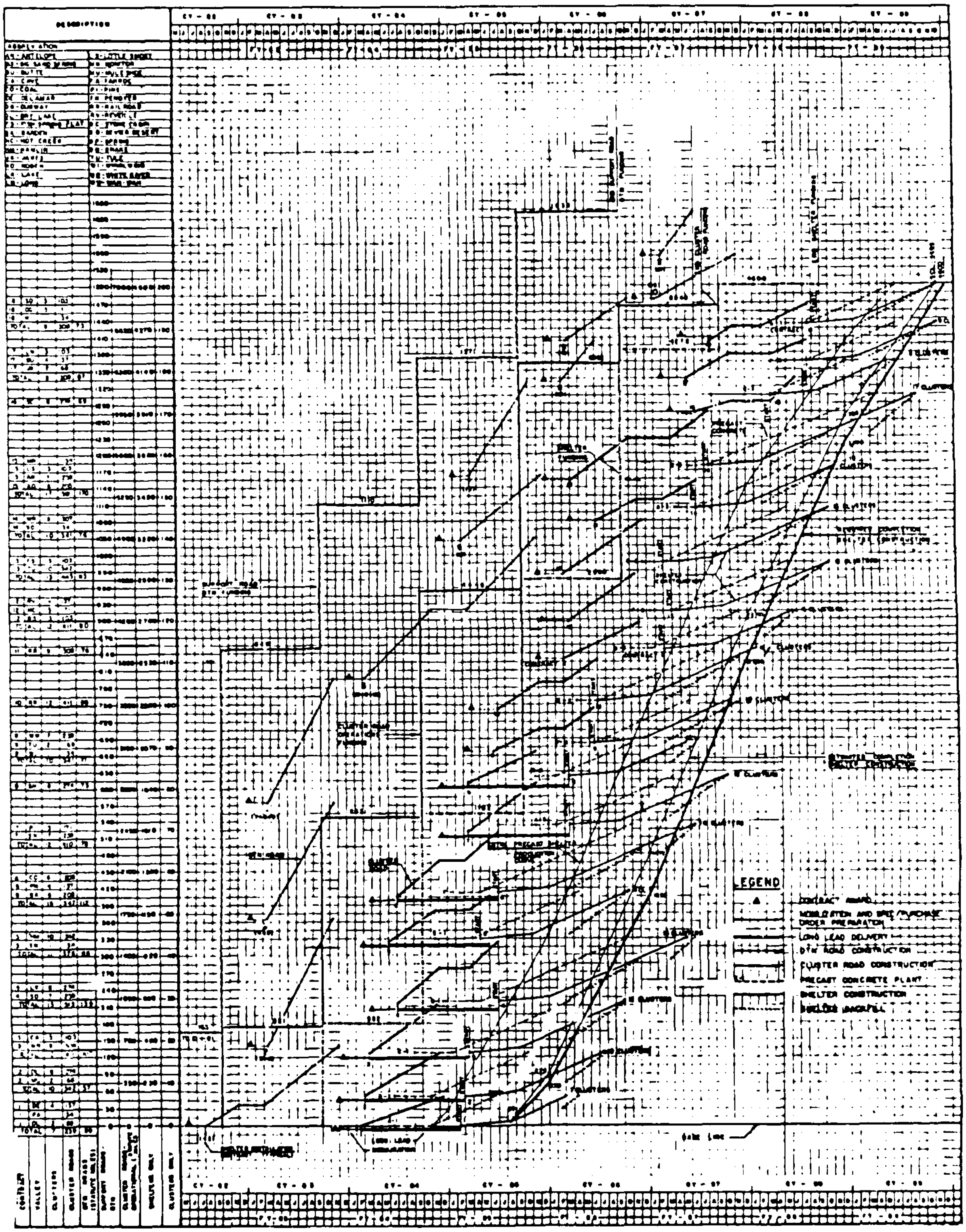


Figure 5-4 - Construction Contracting Sequencing

5-20

FIGURE 1-3

The Ralph M. Parsons Company
ENGINEERS • CONSTRUCTORS / PASADENA, CALIFORNIA 91124

December 16, 1980

Department of the Air Force
Ballistic Missile Office
Air Force Systems Command
Norton Air Force Base, California 92409

ATTENTION: Captain R. B. Baker, AFRCE-MX/DEE

SUBJECT: Job No. 6107 - Letter No. 9
MX-MPS Construction Demonstration
Project - Manpower Summary Report

REFERENCE: Contract No. F04704-81-C-0001

Gentlemen:

Attached is the Manpower Histogram and the tabular data derived from that chart. This chart was prepared during the Working Group Meeting of November 5 to 13, 1980.

Very truly yours,

THE RALPH M. PARSONS COMPANY

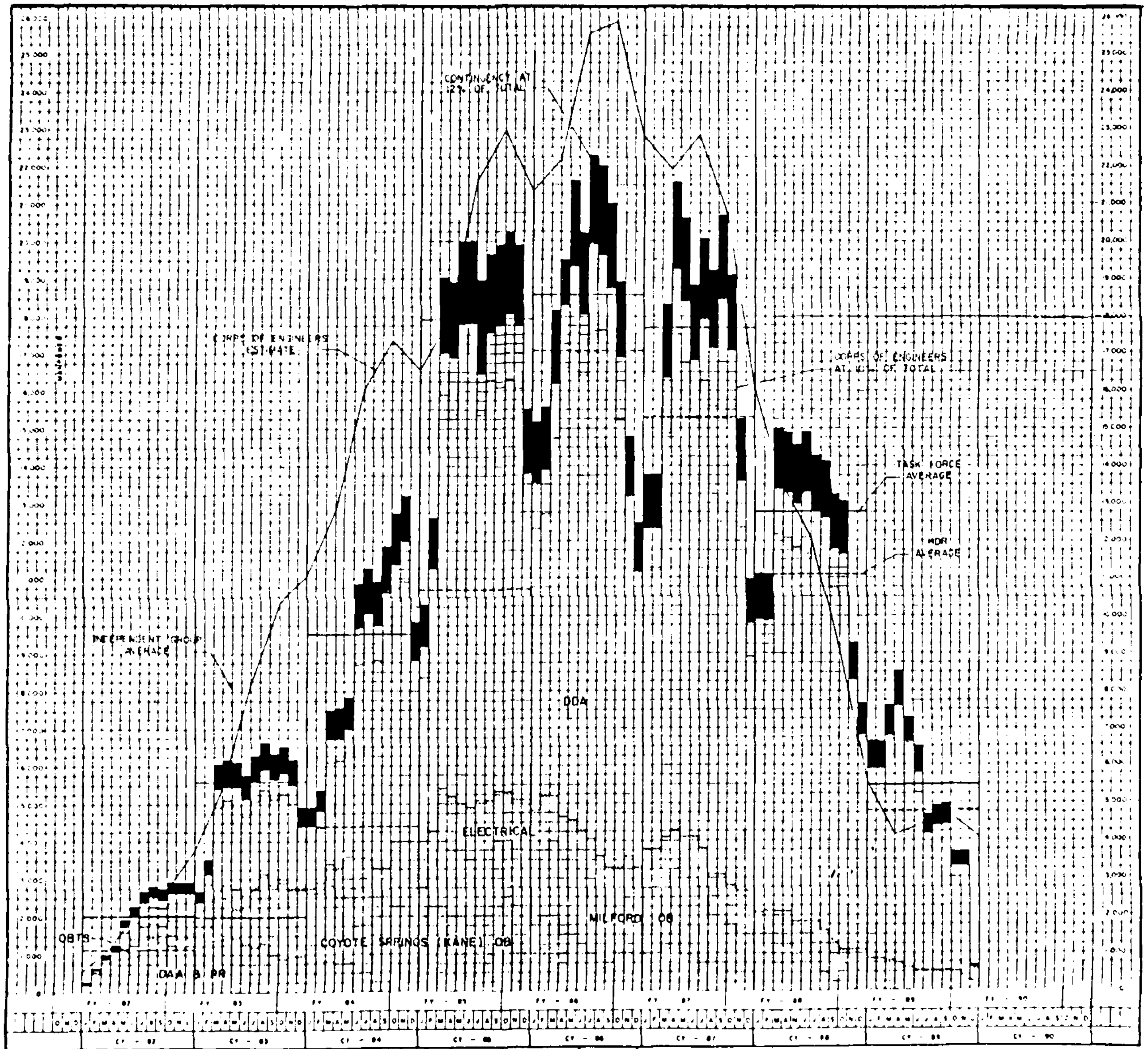
John E. McCarney

John E. McCarney
Principal Project Manager

JEM:es

Attachments

FIGURE 1-4



MX VERIFIABLE MPS
TASK FORCE DEVELOPED WORK FORCE HISTOGRAM
DIRECT CONSTRUCTION INCL LIFE SUPPORT, COE AND CONTINGENCY

THE RALPH M. PARSONS COMPANY

DATE 11/13/80

SUBJECT MANPOWER SUMMARY

TASK FORCE

JOB NO MX

P1 OF 4

CAL YR.	MON	DAA	OBTS MON	OBTS CUM	OB#1 MON	OB#1 CUM	OB#2 MON	OB#2 CUM	ELEC MON	ELEC CUM	DDA MON	DDA CUM	C&E MON	C&E CUM	CONT MON	CONT CUM
1982	J	235	—	—	—	—	—	—	—	—	—	235	24	259	31	291
	F	545	—	—	—	—	—	—	—	—	—	545	55	600	72	672
	M	820	—	—	—	—	—	—	—	—	—	820	80	900	108	1008
	A	900	100	1000	—	—	—	—	—	—	—	1000	100	1100	132	1232
	M	920	250	1170	—	—	—	—	—	—	424	1594	156	1750	210	1960
	J	990	250	1240	—	—	—	—	200	1440	424	1864	186	2050	246	2296
	J	1153	260	1413	—	—	—	—	350	1763	424	2187	219	2406	289	2688
	A	1177	250	1427	—	—	—	—	400	1827	446	2273	227	2500	300	2800
	S	1081	250	1331	—	—	—	—	450	1781	446	2227	223	2450	294	2744
	O	1268	250	1518	—	—	—	—	400	1918	446	2364	236	2600	312	2912
	N	1218	200	1418	—	—	—	—	500	1918	446	2364	236	2600	312	2912
	D	1240	200	1440	—	—	—	—	500	1940	424	2364	236	2600	312	2912
1983	J	1058	150	1208	—	—	—	—	550	1758	424	2182	218	2400	288	2688
	F	1440	100	1545	250	1690	—	—	650	2440	424	2864	286	3150	378	3528
	M	1440	100	1540	510	1950	—	—	650	2700	2210	4910	490	5400	648	6048
	A	1450	50	1500	750	2250	—	—	600	2850	2250	5100	500	5500	660	6160
	M	1450	—	—	750	2200	—	—	550	2750	2205	4955	495	5450	654	6104
	J	1300	—	—	1000	2300	—	—	250	2550	2132	4682	468	5150	618	5768
	J	1200	—	—	1500	2700	—	—	100	2800	2290	5090	510	5600	672	6272
	A	1300	—	—	1750	3050	—	—	100	3150	2214	5364	536	5900	708	6608
	S	1000	—	—	1750	2750	—	—	100	2850	2287	5137	513	5650	678	6328
	O	900	—	—	2000	2900	—	—	100	3000	2273	5273	527	5800	696	6496
	N	950	—	—	1750	2700	—	—	50	2750	2250	5000	500	5500	660	6160
	D	950	—	—	1750	2700	—	—	50	2750	2214	4000	400	4400	528	4928

THE RALPH M. PARSONS COMPANY

BY   DATE 11/13/80

SUBJECT MANPOWER SUMMARY   JOB NO

TASK FORCE   P 2 OF 4

YR	Mon.	DAA	CBTS MON	CBTS CUM	OB #1 MON	OB #1 CUM	OB #2 MON	OB #2 CUM	ELEC MON	ELEC CUM	DDA MON	DDA CUM	CoE MON	CoE CUM	CONTINGENCY MON	CONTINGENCY CUM
1984	J	750	—	—	1750	2600	—	—	150	2750	1250	4000	400	4400	528	4928
	F	800	—	—	1800	2600	—	—	300	2200	1464	4364	436	4800	576	5376
	M	800	—	—	2000	2800	—	—	600	3400	2691	6091	609	6700	804	7504
	A	750	—	—	1750	2500	—	—	800	3300	2837	6137	613	6750	810	7560
	M	750	—	—	1750	2500	—	—	1100	3600	2764	6364	636	7000	840	7840
	J	500	—	—	1250	1750	—	—	1800	3550	5150	8700	870	9700	1164	10864
	J	500	—	—	1250	1750	—	—	1800	3550	5600	9150	900	10050	1206	11256
	A	250	—	—	1750	2000	—	—	1280	3280	5520	8800	950	9750	1170	10920
	S	250	—	—	1750	2000	—	—	1280	3280	6320	9600	1000	10600	1272	11872
	O	—	—	—	2250	2250	500	2750	1750	4000	6416	10416	934	11350	1362	12712
	N	—	—	—	2250	2250	500	2750	1750	4400	6900	10900	1100	12000	1440	13440
	D	—	—	—	2000	2000	750	2750	1750	4000	4000	8000	1188	8800	1056	9856
1985	J	—	—	—	2000	2000	750	1750	1250	4000	4347	8347	833	9200	1104	10304
	F	—	—	—	2250	2250	750	3000	1275	4275	5977	10252	1025	11250	1350	12600
	M	—	—	—	2250	2250	1750	4000	1400	5400	10500	15900	1100	17,000	2040	19040
	A	—	—	—	2000	2000	1750	3750	1450	5200	10050	15250	1650	16,900	2028	18928
	M	—	—	—	2000	2000	1750	3750	1250	5000	11250	16250	1600	17850	2142	19992
	J	—	—	—	1750	1750	1750	3500	1400	4900	11350	16250	1600	17850	2142	19992
	J	—	—	—	2000	2000	1750	3750	1335	5085	10269	15350	1600	16950	2034	18984
	A	—	—	—	2000	2000	1750	3750	1335	5085	11015	16300	1250	17550	2106	19656
	S	—	—	—	2250	2250	1750	4000	1335	5335	10765	16100	1650	17750	2130	19880
	O	—	—	—	2500	2250	1500	4000	1300	5300	11000	16300	1750	18050	2166	20216
	N	—	—	—	2250	2250	1500	3750	1350	5100	10950	16050	1700	17750	2130	19880
	D	—	—	—	2250	2250	1500	3750	1350	5100	7500	12600	1200	13800	1656	15456

THE RALPH M. PARSONS COMPANY

BY

DATE 11/13/80

SUBJECT MANPOWER SUMMARY TASK FORCE

JOB NO MX

P3 OF 4

YR	MON	DAA	OBTS MON	OBTS CUM	OB#1 MON	OB#1 CUM	OB#2 MON	OB#2 CUM	ELEC MON	ELEC CUM	DDA MON	DDA CUM	Q&E MON	Q&E CUM	CONTINGENCY MON	CONTINGENCY CUM
'86	J	—	—	—	1750	1750	1750	3500	1335	4835	7483	12318	1232	13550	1626	15176
	F	—	—	—	2000	2000	1750	3750	1450	5200	7500	12700	1200	13900	1668	15568
	M	—	—	—	2000	2000	2000	4000	1200	5200	9527	14727	1473	16200	1512	18144
	A	—	—	—	1500	1500	2000	3500	1150	4650	11986	16636	1664	18300	2196	20496
	M	—	—	—	1500	1500	2000	3500	1050	4550	12995	17545	1755	19300	2316	21616
	J	—	—	—	1250	1250	2000	3250	1050	4300	12109	16409	1641	18050	2166	20216
	J	—	—	—	1000	1000	2000	3000	1050	4050	14041	18091	1809	19900	2388	22288
	A	—	—	—	750	750	1750	2500	1100	3600	14000	17600	2050	19650	2358	22008
	S	—	—	—	750	750	1500	2250	1050	3300	13745	17045	1705	18750	2250	21000
	O	—	—	—	1000	1000	1250	2250	1050	3300	11946	15364	1536	16900	2028	18928
	N	—	—	—	1000	1000	1500	2500	1100	3600	8400	12000	1200	13200	1584	14784
	D	—	—	—	750	750	1500	2250	1050	3300	6836	10136	1014	11150	1338	12488
'87	J	—	—	—	1000	1000	1750	2750	1050	3800	7382	11182	1118	12300	1476	13776
	F	—	—	—	1000	1000	1750	2750	1050	3800	7382	11182	1118	12300	1476	13776
	M	—	—	—	1250	1250	1500	2750	1350	4100	10764	14864	1486	16350	1962	18312
	A	—	—	—	1250	1250	1750	3000	1300	4300	13200	17500	1750	19250	2310	21560
	M	—	—	—	1000	1000	2000	3000	1100	4100	12527	16727	1673	18400	2208	20608
	J	—	—	—	1000	1000	2000	3000	1100	4100	11173	15273	1527	16800	2016	18816
	J	—	—	—	750	750	2000	2750	1050	3800	12473	16273	1627	17900	2148	20048
	A	—	—	—	750	750	1250	2000	1100	3100	12491	15591	1559	17150	2058	19208
	S	—	—	—	750	750	1250	2000	1100	3100	13673	16773	1677	18450	2214	20664
	O	—	—	—	500	500	1250	1750	1050	2800	12700	15500	1550	17050	2046	19096
	N	—	—	—	500	500	1000	1500	1150	2650	9714	12364	1256	13600	1632	15232
	D	—	—	—	500	500	1000	1500	1150	2650	5350	8900	900	9800	1176	10976

THE RALPH M. PARSONS COMPANY

BY

DATE 11/13/80

SUBJECT MANPOWER SUMMARY

JOB NO

TASK FORCE

PAGE 4

YR.	MON	DAA	OB TS MON	OB TS CUM	OB #1 MON	OB #1 CUM	OB #2 MON	OB #2 CUM	ELEC MON	ELEC CUM	DDA MON	DDA CUM	C of E MON	C of E CUM	CONTINGENCY MON	CONTINGENCY CUM
'88	J	—	—	—	—	—	1000	1000	1100	2100	6900	9000	900	9900	1188	11088
	F	—	—	—	—	—	1000	1000	1125	2125	6875	1000	900	9100	1188	11088
	M	—	—	—	—	—	1000	1000	1100	2100	10082	12182	1219	13400	1608	15008
	A	—	—	—	—	—	1000	1000	1100	2100	9991	12091	1229	13300	1596	14896
	M	—	—	—	—	—	750	750	1100	1850	9768	11818	1182	13200	1560	14560
	J	—	—	—	—	—	750	750	1100	1850	10241	12091	1209	13300	1596	14896
	J	—	—	—	—	—	750	750	1100	1850	9741	11591	1159	12750	1530	14280
	A	—	—	—	—	—	500	500	1100	1600	9700	11300	1300	12600	1512	14112
	S	—	—	—	—	—	250	250	1050	1300	9427	10727	1073	11800	1416	13216
	O	—	—	—	—	—	—	—	1100	1100	9490	10591	1059	11650	1398	13048
	N	—	—	—	—	—	—	—	1100	1100	6445	7545	755	8300	996	9296
	D	—	—	—	—	—	—	—	1100	1100	5127	6227	623	6850	822	7672
'89	J	—	—	—	—	—	—	—	865	865	4499	5364	536	5900	708	6608
	F	—	—	—	—	—	—	—	865	865	4499	5364	536	5900	708	6608
	M	—	—	—	—	—	—	—	815	815	5367	6182	618	6800	828	7616
	A	—	—	—	—	—	—	—	740	740	6164	6909	691	7600	912	8512
	M	—	—	—	—	—	—	—	615	615	5385	6000	600	6600	792	7392
	J	—	—	—	—	—	—	—	515	515	4758	5273	527	5800	696	6496
	J	—	—	—	—	—	—	—	515	515	3303	3818	382	4200	504	4704
	A	—	—	—	—	—	—	—	515	515	3485	4000	400	4400	528	4928
	S	—	—	—	—	—	—	—	510	510	3535	4045	405	4450	534	4984
	O	—	—	—	—	—	—	—	500	500	2500	3000	300	3300	396	3696
	N	—	—	—	—	—	—	—	400	400	2600	3000	300	3300	396	3696
	D	—	—	—	—	—	—	—	250	250	295	545	55	600	72	672

DEPARTMENT OF THE ARMY
SOUTH PACIFIC DIVISION CORPS OF ENGINEERS
630 SANSOME STREET, ROOM 1216
SAN FRANCISCO, CALIFORNIA 94111

SPD-MX-N

14 November 1980

SUBJECT: Construction Area Manpower Estimates

AFRCE-MX/DE

1. As you know, for the past two weeks we have been engaged in a concert effort to resolve the discrepancy between the manpower estimates derived the Corps for the total construction force required in the Deployment Ar and those derived by HDR for use in the Draft EIS. The Corps numbers, based on program estimates, were derived as early as 1979 in order to pr vide an estimate for the total Corps work force required and were includ in our Management Plan published in October 1979. Subsequent refinement of a minor nature were made during the Life Support Working Group delibe tions in July and August. Inasmuch as these numbers projected a signifi larger construction work force than that projected by HDR, we agreed to form a more detailed estimate based on best information available as to current program schedule, possible sequence of construction and use of c struction techniques which we have projected as tending to reduce the to number of construction workers required. This letter presents the resul of that analysis and outlines succeeding steps which must be taken.

2. As an approach to this more refined estimate, it was agreed that we would jointly form an estimating Task Force which would rely on the port of the overall construction which had been studied in some detail by you contractor, The Ralph M. Parsons Company, and for which a "nuts and bolt estimate existed for a major portion of the work, i.e., the Designated Deployment Area. We would then derive best estimates for the remainder the program, i.e., Operating Bases, Electrical Distribution System, DAA, OBTS and other elements not included in the Parsons estimate, assuming o best guess on construction seasons, working hours, efficiency factors an other significant elements in the expectation this would lead to the bes overall Program Estimate available at this time. This was done and the results are summarized in Inclosure 1 for average demand and Inclosure 2 for peak demand. You will note that the manpower strengths derived, whi somewhat below the original Corps program level estimate, remain signifi higher than those in the HDR estimate.

3. As a further check against the validity of this estimate, I requeste assistance from OCE. Two highly qualified individuals were detailed to me and I requested that they: (a) perform an independent estimate using different methodology as a cross-check on the validity of other estimate

FIGURE 1-5

and (b) ~~to~~ examine the validity of techniques and practices employed in the derivation of the Task Force and HDR estimates. Inclosure 1 demonstrates that while the shape of the manpower curve from this independent estimate (labled "Independent Group") is somewhat different from that derived by the Task Force, there is a close agreement on the average and peak numbers, and, most significantly, extremely close agreement on the total man years required to execute the program. They further found the methodology, assumptions and techniques employed by the Task Force to be sound and supportable. These findings lead me to conclude that the estimate derived by the Task Force represents the best estimate available at this time given current knowledge of the program and supportable assumptions regarding program scope, deployment schedule, construction sequencing and construction techniques.

4. Since the numbers derived by the Task Force represent a credible baseline for the total construction labor demand to deploy the system, we can now proceed to a further stage in construction planning by loading the sequence and labor demand into a network analysis system and performing a leveling exercise. In this way we may find it possible to lower the peak numbers by resequencing some construction activities. This may or may not involve reprogramming. The Ralph M. Parsons Company is proposing to perform this network loading exercise on their own software system (McAuto). However, I believe it to be in the best interest of the government to do the resource loading on Project II software which we have adopted as the basic network software for our joint Management Information System. This will require action on your part to direct the Ralph M. Parsons Company to accomplish this task.

5. A further necessary step is to refine our gross labor forecast into a forecast by skill and craft. To accomplish this, I propose to use the Department of Labor's Construction Labor Demand System (CLDS). This system is a parametrically and empirically derived, automated system capable of interfacing with our master schedule and able to project not only our own demands for trades, but our demands versus the available supply considering other major projects and normal demand in the preferred deployment area. I believe it is essential that we get a handle on this as soon as possible, not only for purposes of finalizing the EIS, but also for initiating advance planning on any potential labor shortfalls which might impact the construction schedule. The CLDS appears to be the best means available for accomplishing this at this time.

6. In conclusion, I would add that I believe this has been a very productive effort which has contributed greatly to our construction planning effort. It was made possible by the cooperative and thoroughly professional approach adopted by all parties and I would like to thank CAPT Dolter of your office and the Ralph M. Parsons Company representatives, Messrs. Ron Galletti, Gerry Eide and Jerry Kelly for making this team effort a reality.

FOR THE DIVISION ENGINEER:

2 Incl
as

RICHARD L. CURL
Colonel, CE
Deputy Division Engineer

12 NOV 80

AVERAGE MX MANPOWER ANALYSIS (MAN-YEARS)

CONSTRUCTION, CORPS AND LIFE SUPPORT

		1982	1983	1984	1985	1986	1987	1988	1989
?NDEP.	AVERAGE	3,180	8,170	14,350	20,000	21,500	16,900	5,550	3,700
?ROUP	ACCUM.	3,180	11,350	25,700	45,700	67,200	84,100	89,650	93,350
?ASK	AVERAGE	2,035	5,590	9,510	17,910	18,560	17,670	12,765	5,490
?ORCE	ACCUM.	2,035	7,625	17,135	35,045	53,605	71,275	84,040	89,530
?DR	AVERAGE	1,150	2,000	4,400	10,700	17,050	15,300	11,100	4,800
	ACCUM.	1,150	3,150	7,550	18,250	35,300	50,600	61,700	66,500
?ORPS	AVERAGE	1,650	6,940	14,305	19,750	23,730	16,900	12,670	4,725
?NGRS	ACCUM.	1,650	8,590	22,895	42,645	66,375	83,275	95,945	100,670

18 NOV 80

PEAK MX MANPOWER ANALYSIS (MAN-YEARS)

CONSTRUCTION, CORPS AND LIFE SUPPORT

		1982	1983	1984	1985	1986	1987	1988	1989
INDEP GROUP	PEAK NO.	3,600	9,300	15,500	22,000	22,500	18,000	9,000	4,500
TASK FORCE	PEAK NO.	2,912	6,608	13,440	20,216	22,288	21,500 20,608	15,008	8,512
H.D.R.	PEAK NO.	← NOT			AVAILABLE →				
CORPS ENGRS	PEAK NO.	2,750	10,340	17,360	22,940	25,880	22,820	16,000	5,600

Chapter 2

MX Task Force Manpower Requirements for Coyote Spring Options

1. On 12 February 1981, the previously assembled Task Force was reconvened to evaluate manpower requirements for a "modified tree" construction approach using the boundaries of the 18 construction zones as illustrated in Deployment Area Selection and Land Withdrawal/Aquisition DEIS (Figure 2-1) with the first or second base located at Coyote Spring (Proposed Action and Alternatives 1,2,4, and 6). These boundaries were assumed to constitute the service area for each shelter construction plant and life support camp with the number of clusters per zone varying from 6 to 19.

A. Review of the DEIS construction plans revealed that they had been developed to maximize the dispersion of construction workers in the DDA using a mutiple front construction approach. Also:

(1) The DEIS construction durations per area were relatively short in comparison with RMP's previously developed construction durations using the pre-cast shelter construction method.

(2) As each construction zone area in the DDA was completed, it was not necessarily contiguous to another completed area or the OBs. This essentially required that all DTN for the entire deployment area be completed prior to the completion date of the first construction zone to obtain access and usability of completed shelters in non-contiguous remote clusters.

(3) The DEIS sequence, though constructable, was not acceptable for operational reasons particularly due to installation restrictions of the command, control, and communications system. Apparently, the fiber optic system has limitations on tie-ins and couplings and requires repeaters at 10 km intervals. In addition, the DEIS sequence was unsuitable from an operational stand-

point due to widely dispersed physical security requirements and the need for Area Support Center (ASC) construction early in the program.

B. As a result of the foregoing and the need to develop a sequential construction area approach, a revised "modified tree" construction plan was devised using the following assumptions:

(1) There will be six shelter construction plants which would move sequentially among the construction areas as reflected on Table 2-1.

(2) There will be turnover of completed contiguous clusters along the DTN route to permit continuity of communications.

(3) Construction zones would remain as shown in the DEIS scenario (Figure 2-1) including one life support camp per area.

(4) The initial construction start (FY 1982) and construction productivity would remain as previously estimated by the original Task Force.

(5) DTN, Cluster Road, Electrical and Life Support Camps, along with other associated construction features will be prorated to each construction zone according to the number of clusters in that zone.

6) Month by month manpower estimates from Chapter 1 be converted to average annual personnel in manyears per construction zone.

C. Based upon the foregoing assumptions, a DDA construction sequence and schedule was developed to meet AF Need Dates (AFND). From this schedule Table 2-1 was developed fo moving and utilizing the construction plants. A simplified construction schedule has been superimposed over the DEIS proposed construction schedule for comparison (Figure 2-2). Next, the number of construction manmonths per cluster was determined and assigned to each item of work; i.e., the construction of the initial DTN Roads, Life Support Camps, Electrical Systems, Cluster Roads, Shelter Plants (shelter segment fabrication), Cluster Sitework (shelter and CMF installation), Road Finishing and ASC's. The estimate for the electrical construction was developed during the original Task

Force Study (see chapter 1) and the estimate for ASC construction manpower requirements was based upon the assumption that one ASC will require roughly the same manpower as required to build one cluster. Using these estimating parameters, along with the construction durations developed for each item of work, the number of men and manyears was calculated for each DEIS construction zone as shown in Table 2-2. After arriving at the number of men required per item of work, the information was chronologically laid out to arrive at total DDA construction manpower by construction zone and calendar year as shown in Table 2-3.

D. Revised A&CO manpower figures by geographical area are shown on Table 2-4. These estimates were distributed using the sequential construction schedule and DEIS construction zones. This schedule indicates a delivery rate of approximately 4.6 clusters per month after completion of construction. The A&CO manpower estimate includes personnel from BMO, AFCMD, AFRCE, AFTEC, SAC (SATAF only), AFCC, BLM, DMA, TRW, and other miscellaneous contractors, including life support. The A&CO manpower estimates are similar to those presented in the MX Financial Planning Estimate dated 13 February 1981. However, there are some differences due to generalizations made while converting A&CO figures from a fiscal year basis to calendar year annual averages.

E. To determine the manpower per zone per year, manpower totals (direct construction, Corps of Engineers, contingency, and A&CO) were distributed over each DEIS construction zone and calendar year for the DDA as reflected in Table 2-5. Operational manpower, as listed on Table 2-6, along with the annualized totals for the construction of the OBTS/DAA/OBs from the original Task Force were then added to the foregoing totals to arrive at the grand totals by calender year and type to form the manpower summary in Table 2-7.

Construction Plant Move Sequence- Coyote Spring Options						
		Sequence Number				Total Clusters Per Plant
		1	2	3	4	
Plant A	Zone	1	10	17		
	No. of Clusters	11	16	10		37
Plant B	Zone	2	12	11		
	No. of Clusters	13	8	8		29
Plant C	Zone	3	14	18		
	No. of Clusters	13	6	13		32
Plant D	Zone	4	5	16	15	
	No. of Clusters	11	9	6	9	35
Plant E	Zone	9	13			
	No. of Clusters	17	19			36
Plant F	Zone	6	8	7		
	No. of Clusters	11	10	10		31

Table 2-1

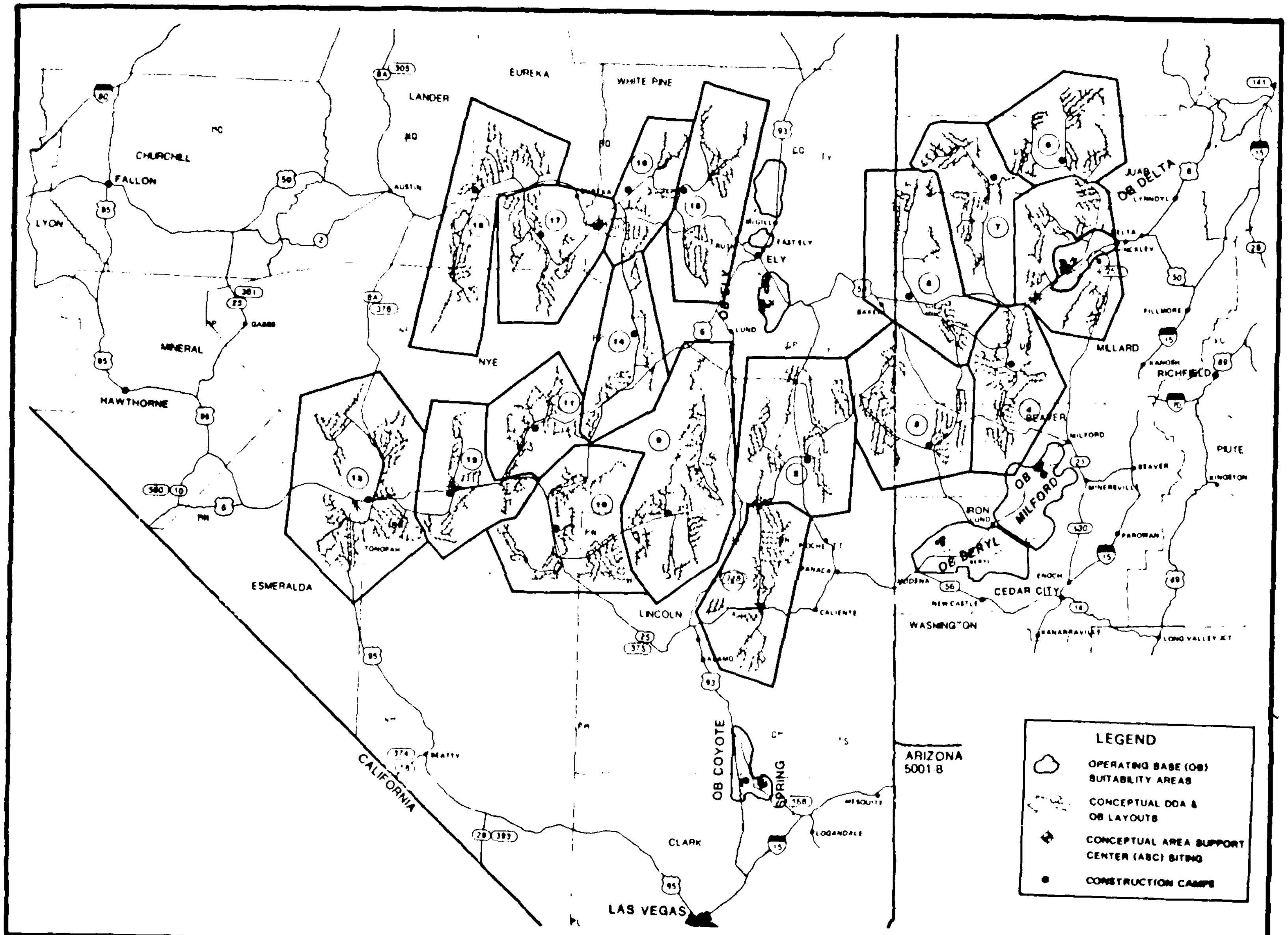
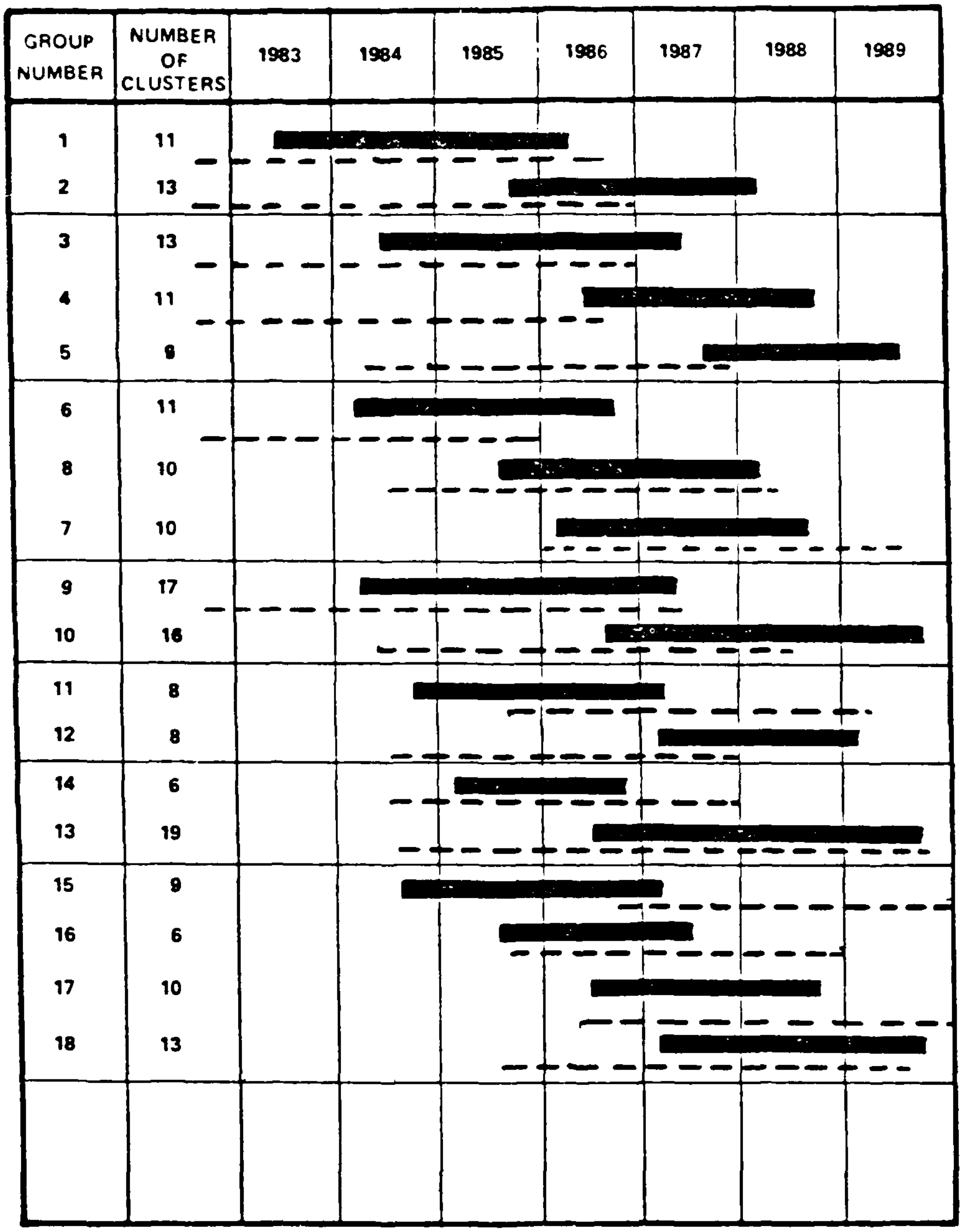


Figure 2-1 Construction Zones as depicted in the Deployment Area Selection and Land Withdrawal/Acquisition DEIS

DDA Construction Schedule-- Coyote Springs Option



DEIS Construction Schedule

Task Force Construction Schedule

Figure 2-2

Manpower Factors, Coyote Spring Options

Zone No.	No. of Clus	DTN, Initial Constr.			Camp Construction			Electrical			Cluster Roads		
		No. of Month	Man Months (@110/clu)	No. of MnYr	No. of Month	Man Months (@120/clu)	No. of MnYr	No. of Month	Man Months (@422/clu)	No. of MnYr	No. of Month	Man Months (@400/clu)	No. of MnYr
1	11	12	1210	101	12	1320	110	12	4642	387	12	4400	367
2	13	12	1430	120	12	1560	130	12	5486	457	12	5200	433
3	13	12	1430	120	12	1560	130	12	5486	457	12	5200	433
4	11	12	1210	101	12	1320	110	12	4642	387	12	4400	367
5	9	12	990	83	12	1080	90	12	3798	317	12	3600	300
6	11	12	1210	101	12	1320	110	12	4642	387	12	4400	367
7	10	12	1100	92	12	1200	100	12	4220	352	12	4000	333
8	10	12	1100	92	12	1200	100	12	4220	352	12	4000	333
9	17	12	1870	156	12	2040	170	12	7171	598	12	6800	576
10	16	12	1760	147	12	1920	160	12	6752	562	12	6400	534
11	8	12	880	73	12	960	80	12	3376	281	12	3200	267
12	8	12	880	73	12	960	80	12	3376	281	12	3200	267
13	19	12	2090	174	12	2280	190	12	8018	668	12	7600	633
14	6	12	660	55	12	720	60	12	2532	211	12	2400	200
15	9	12	990	83	12	1080	90	12	3798	317	12	3600	300
16	6	12	660	55	12	720	60	12	2532	211	12	2400	200
17	10	12	1100	92	12	1200	100	12	4220	352	12	4000	333
18	13	12	1430	120	12	1560	130	12	5486	457	12	5200	433
Total	200		22000			24000			84405			80000	

Table 2-2

Manpower Factors, Coyote Spring Options														
Zone No.	No. of Clus	Construction Plant			Cluster Site Work			Road Finish			ASC Construction			
		No. of Month	Man Months (@900+/clu)	No. of MnYr	No. of Month	Man Months (1344+/clu)	No. of MnYr	No. of Month	Man Months (@105/clu)	No. of MnYr	No. of Month	Man Months (@1350 ea)	No. of MnYr
1	11	17	10000	833	19	14934	1245	3	1155	95	-	-	-
2	13	19	11176	931	21	16506	1375	3	1365	114	12	1350	112
3	13	19	11176	931	21	16506	1375	3	1365	114	-	-	-
4	11	17	10000	833	19	14934	1245	3	1155	95	-	-	-
5	9	14	8235	686	16	12576	1047	3	945	79	-	-	-
6	11	17	10000	833	19	14934	1245	3	1155	95	12	1350	112
7	10	16	9412	784	18	14148	1179	3	1050	88	-	-	-
8	10	16	9412	784	18	14148	1179	3	1050	88	-	-	-
9	17	24	14118	1176	26	20436	1703	3	1785	148	-	-	-
10	16	23	13529	1127	25	19650	1637	3	1680	142	-	-	-
11	8	13	7647	637	15	11790	983	3	840	70	-	-	-
12	8	13	7647	637	15	11790	983	3	840	70	12	1350	112
13	19	27	15882	1323	29	22794	1900	3	1995	165	-	-	-
14	6	11	6470	539	13	10218	852	3	630	53	-	-	-
15	9	14	8235	686	16	12576	1047	3	945	79			
16	6	11	6470	539	13	10218	851	3	630	53	12	1350	112
17	10	16	9412	784	18	14148	1179	3	1050	88	-	-	-
18	13	19	11176	931	21	16506	1375	3	1365	114	-	-	-
Total	200		180000			268800			21000			5400	

Table 2-2 Continued

Manyear Loading for Coyote Spring Options

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	1	11				25		76													95																	
Camp Const.						16		94																														
Electrical						32		42				111					83			119																		
Cluster Roads										92		275																										
Const. Plant														294			539																					
Clust. Site Work																	786			459																		
ASC																																						
DTN	2	13				30		90														114																
Camp Const.						19		111																														
Electrical						38			50			131				98				140																		
Cluster Roads									108			325																										
Const. Plant													294			588			49																			
Clust. Site Work																	786			590																		
ASC																				112																		
DTN	3	13				30		90														114																
Camp Const.						19		111																														
Electrical						38			50			131				98				140																		
Cluster Roads										108		325																										
Const. Plant														294		588			49																			
Clust. Site Work																	786			598																		
ASC																																						
Total																																						

TABLE 2-3

Manyear Loading for Coyote Spring Options

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DAN	1	11				25		76													95																	
Camp Const.						16		94																														
Electrical						32		42				111				83				119																		
Cluster Roads										92		273																										
Const. Plant														294		539																						
Clust. Site Work																786				159																		
[illegible]																																						
DAN	[illegible]	[illegible]											55		25												79											
Camp Const.													52		38																							
Electrical													53			37				78				149														
Cluster Roads																	175			125																		
Const. Plant																					392			294														
Clust. Site Work																					393			654														
[illegible]																																						
DAN	[illegible]	11				25		76														95																
Camp Const.						15		97																														
Electrical						41			[illegible]			107				18				89																		
Cluster Roads										92		273																										
Const. Plant														294		539																						
Clust. Site Work																786			200																			
[illegible]																					113																	
[illegible]																																						

TABLE 2-3 (Cont.)

AD-A149 922 DEPLOYMENT AREA SELECTION AND LAND WITHDRAWAL/ACQUISITION M-X/MPS (M-X/MU..(U) HENNINGSON DURHAM AND RICHARDSON SANTA BARBARA CA 02 OCT 81 3/3

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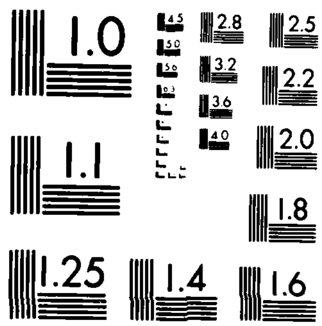

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Manyear Loading for Coyote Spring Options

	Zone	Clusters	1982				1983				1984			
			1	2	3	4	1	2	3	4	1	2	3	4
DTN	7	10												
Camp Const.														
Electrical														
Cluster Roads														
Const. Plant														
Clust. Site Work														
ASC														
DTN	8	10											46	
Camp Const.														42
Electrical														42
Cluster Roads														
Const. Plant														
Clust. Site Work														
ASC														
DTN	9	17				39		117						
Camp Const.						25		145						
Electrical						50			65			169		
Cluster Roads										142		425		
Const. Plant														291
Clust. Site Work														131
ASC														
Total														

	1985				1986				1987			
	1	2	3	4	1	2	3	4	1	2	3	4
DTN						92						
Camp Const.						92			8			
Electrical						55				100		
Cluster Roads										333		
Const. Plant												
Clust. Site Work												
ASC												
DTN	46											
Camp Const.		58										
Electrical		42					80				188	
Cluster Roads			167			166						
Const. Plant							294			490		
Clust. Site Work								262		786		
ASC												
DTN									148			
Camp Const.												
Electrical		130				184						
Cluster Roads												
Const. Plant			588			294						
Clust. Site Work			786			786						
ASC												
Total												

	1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4
DTN							88					
Camp Const.												
Electrical		67				130						
Cluster Roads												
Const. Plant		588			196							
Clust. Site Work		786				393						
ASC												
DTN		88										
Camp Const.												
Electrical												
Cluster Roads												
Const. Plant												
Clust. Site Work	131											
ASC												
DTN												
Camp Const.												
Electrical												
Cluster Roads												
Const. Plant												
Clust. Site Work												
ASC												
Total												

TABLE 2-3 (Cont.)

Manyear Loading for Coyote Spring Options

	Zone	Clusters	1982				1983				1984				1985			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	10	16											98		49			
Camp Const.														93	67			
Electrical													103				98	
Cluster Roads																	355	
Const. Plant																		
Clust. Site Work																		
ASC																		
DTN	11	8																18
Camp Const.																		13
Electrical																		8
Cluster Roads																		
Const. Plant																		
Clust. Site Work																		
ASC																		
DTN	12	8												37		36		
Camp Const.														33		47		
Electrical														30			33	
Cluster Roads																		134
Const. Plant																		
Clust. Site Work																		
ASC																		
Total																		

	1986				1987				1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN											142									
Camp Const.																				
Electrical			93			160				108										
Cluster Roads	179																			
Const. Plant			509			588			30											
Clust. Site Work			528			786				328										
ASC																				
DTN		57												70						
Camp Const.		67																		
Electrical		70				80				50			73							
Cluster Roads				67		200														
Const. Plant								245		392										
Clust. Site Work								192		76 8			21							
ASC																				
DTN								70												
Camp Const.																				
Electrical		70				148														
Cluster Roads		133																		
Const. Plant			294			343														
Clust. Site Work				262			721													
ASC						112														
Total																				

TABLE 2-3 (Cont.)

Manyear Loading for Coyote Spring Options

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	13	19												15			159																	165					
Camp Const.																	190																						
Electrical																	62			160				204				69			173								
Cluster Roads																		53			580																		
Const. Plant																						49		588				588			98								
Clust. Site Work																								786				786				328							
ASC																																							
DTN	14	6												28		27										53													
Camp Const.														25		35																							
Electrical														25		25				90				71															
Cluster Roads																	100			100																			
Const. Plant																					294			245															
Clust. Site Work																						262		590															
ASC																																							
DTN	15	9																				21		62										79					
Camp Const.																						15		75															
Electrical																						17			120			80				100							
Cluster Roads																										75		225											
Const. Plant																													441			233							
Clust. Site Work																														261			786						
ASC																																							
Total																																							

TABLE 2-3 (Cont.)

Manyear Loading for Coyote Spring Options

	Zone	Clusters	1982				1983				1984			
			1	2	3	4	1	2	3	4	1	2	3	4
DTN	16	6												
Camp Const.														
Electrical														
Cluster Roads														
Const. Plant														
Clust. Site Work														
ASC														
DTN	17	10												
Camp Const.														
Electrical														
Cluster Roads														
Const. Plant														
Clust. Site Work														
ASC														
DTN	18	13												
Camp Const.														
Electrical														
Cluster Roads														
Const. Plant														
Clust. Site Work														
ASC														
Total														

	1985				1986				1987			
	1	2	3	4	1	2	3	4	1	2	3	4
DTN				18		37						
Camp Const.				15			45					
Electrical				8			60			60		
Cluster Roads								67		133		
Const. Plant											245	
Clust. Site Work												262
ASC												
DTN							69		23			
Camp Const.							67		33			
Electrical							64			140		
Cluster Roads											250	
Const. Plant												
Clust. Site Work												
ASC												
DTN				50		70						
Camp Const.				43		87						
Electrical				20		130				148		
Cluster Roads								144		289		
Const. Plant												294
Clust. Site Work												327
ASC												
Total												

	1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4
DTN				53								
Camp Const.												
Electrical		83										
Cluster Roads												
Const. Plant		294										
Clust. Site Work			589									
ASC		113										
DTN								88				
Camp Const.												
Electrical		48					100					
Cluster Roads		83										
Const. Plant			588		196							
Clust. Site Work		590					589					
ASC												
DTN							114					
Camp Const.												
Electrical		35				124						
Cluster Roads												
Const. Plant		588			50							
Clust. Site Work		786			262							
ASC												
Total												

TABLE 2-3 (Cont.)

Average A&CO Personnel
Coyote Spring Options

Zone	No. of Clusters	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	11	10	100	150	1000	600				
2	13			50	150	800	300			
3	13			25	25	800	325			
4	11			25		625	400			
5	9					25	50	575		
6	11			25	25	225	675			
7	10						25	75	900	
8	10					25	225	600		
9	17			25	25	700	800			
10	16				25	50	500	800		
11	8					25	25	225	400	
12	8					25	325	200		
13	19					25	25	600	850	25
14	6					25	525			
15	9						25	225	700	25
16	6					25	25	225	300	
17	10						25	325	600	25
18	13					25	25	500	600	25
1st OB/DAA		50	200	500	900	1250	1250	1250	1250	250
2ond OB							50			
Total		60	300	800	2150	5250	5600	5600	5600	350
Las Vegas *		250	500	600	300	200	200	200	200	100
Grand Total		310	800	1400	2450	5450	5800	5800	5800	450

* There will be 30 A&CO personnel in Las Vegas in 1981

TABLE 2-4

Workforce Distribution Coyote Spring Options

Page 1 of 7

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	Construction	73	304	680	1408	673				
	COE* and Contingency**	17	71	158	327	156				
	Subtotal	90	375	838	1735	829				
	A&CO	10	100	150	1000	600				
	Total	100	475	988	2735	1429				
2	Construction	87	359	750	1472	1005				
	COE* and Contingency**	20	83	174	342	233				
	Subtotal	107	442	924	1814	1238				
	A&CO	--	--	50	150	800	300			
	Total	107	442	974	1964	2038	300			
3	Construction	87	359	750	1472	893				
	COE* and Contingency**	20	83	174	342	207				
	Subtotal	107	442	924	1814	1100				
	A&CO	--	--	25	25	800	325			
	Total	107	442	949	1839	1900	325			

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 2-5

Workforce Distribution Coyote Spring Options										Page 2 of 7
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
4	Construction	73	304	680	1408	673				
	COE* and Contingency**	17	71	158	327	156				
	Subtotal	90	375	838	1735	829				
	A&CO	--	--	25	--	625	400			
	Total	90	375	863	1735	1454	400			
5	Construction			160	278	988	1176			
	COE* and Contingency**			37	64	229	273			
	Subtotal			197	342	1217	1449			
	A&CO			--	--	25	50	575		
	Total			197	342	1242	1499	575		
6	Construction	87	359	676	1373	756				
	COE* and Contingency**	20	83	156	319	176				
	Subtotal	107	442	832	1692	932				
	A&CO	--	--	25	25	225	675			
	Total	107	442	857	1717	1157	675			

* COE value obtained by multiplying Construction Worker estimates by .10
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 2-5 continued

Workforce Distribution Coyote Spring Options

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
7	Construction					239	441	1441	807	
	COE* and Contingency**					55	102	334	187	
	Subtotal					294	543	1775	994	
	A&CO					--	25	75	900	
	Total					294	568	1850	1894	
8	Construction			130	313	802	1464	219		
	COE* and Contingency**			30	73	186	340	51		
	Subtotal			160	386	988	1804	270		
	A&CO			--	--	25	225	600		
	Total			160	386	1013	2029	870		
9	Construction	115	469	1019	1500	1264	148			
	COE* and Contingency**	27	109	237	348	293	34			
	Subtotal	142	578	1256	1848	1557	182			
	A&CO	--	--	25	25	700	800			
	Total	142	578	1281	1863	2257	982			

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 2-5 continued

Workforce Distribution Coyote Spring Options

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
10	Construction			294	569	1309	1534	608		
	COE* and Contingency**			69	132	304	356	141		
	Subtotal			363	701	1613	1890	749		
	A&CO			--	25	50	500	800		
	Total			363	726	1663	2390	1549		
11	Construction				39	261	717	1210	164	
	COE* and Contingency**				9	61	166	281	38	
	Subtotal				48	322	883	1491	202	
	A&CO				--	25	25	225	400	
	Total				48	347	908	1716	602	
12	Construction			100	250	759	1394			
	COE* and Contingency**			23	58	176	323			
	Subtotal			123	308	935	1717			
	A&CO			--	--	25	325	200		
	Total			123	308	960	2042	200		

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 2-5 continued

Workforce Distribution Coyote Spring Options										Page 5 of 7
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
13	Construction			15	464	789	1579	1443	764	
	COE* and Contingency**			3	108	183	367	334	177	
	Subtotal			18	572	972	1946	1777	941	
	A&CO			--	--	25	25	600	850	25
	Total			18	572	997	1971	2377	1791	25
14	Construction			78	187	742	959			
	COE* and Contingency**			18	43	172	223			
	Subtotal			96	230	914	1182			
	A&CO			--	--	25	525			
	Total			96	230	939	1707			
15	Construction					53	332	1007	1198	
	COE* and Contingency**					12	77	234	278	
	Subtotal					65	409	1241	1476	
	A&CO					--	25	225	700	25
	Total					65	434	1466	2176	25

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 2-5 continued

Workforce Distribution Coyote Spring Options

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
16	Construction				41	209	700	1132		
	COE* and Contingency**				10	48	162	263		
	Subtotal				51	257	862	1395		
	A&CO				--	25	25	225	300	
	Total				51	282	887	1620	300	
17	Construction					200	446	1309	973	
	COE* and Contingency**					46	103	304	226	
	Subtotal					246	549	1613	1199	
	A&CO					--	25	325	600	25
	Total					246	574	1938	1799	25
18	Construction				113	431	1058	1409	550	
	COE* and Contingency**				26	100	245	327	128	
	Subtotal				139	531	1303	1736	678	
	A&CO				--	25	25	500	600	25
	Total				139	556	1328	2236	1278	25

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 2-5 continued

Workforce Distribution Coyote Spring Options

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
	DDA Grand Total Construction	522	2154	5332	10887	12046	11948	9778	4456	
	COE* and Contingency**	121	500	1237	2528	2793	2771	2269	1034	
	Subtotal	643	2654	6569	13415	14839	14719	12047	5490	
	A&CO	10	100	300	1250	4000	4300	4350	4350	100
	Total	653	2754	6869	14665	18839	19019	16397	9840	100
	Construction									
	COE* and Contingency**									
	Subtotal									
	A&CO									
	Total									
	Construction									
	COE* and Contingency**									
	Subtotal									
	A&CO									
	Total									

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 2-5 continued

OPERATIONAL WORK FORCE COYOTE SPRING OPTIONS

	1982	1983	1984	1985	1986	1987	1988	1989	1990*
OPERATING BASE 1									
OFFICERS		10	34	224	487	610	610	610	
ENLISTED		27	148	1907	4342	5900	5900	5900	
CIVILIANS		2	52	480	848	1212	1212	1220	
TOTAL		39	234	2611	5677	7722	7722	7730	
OPERATING BASE 2									
OFFICERS				5	12	166	262	290	
ENLISTED				24	170	1513	3416	4275	
CIVILIANS				2	64	267	819	1035	
TOTAL				31	246	1946	4497	5600	
TOTAL WORK FORCE		39	234	2642	5923	9668	12219	13330	

* Population in 1990 and subsequent years are the same as 1989

TABLE 2-6

MANPOWER SUMMARY COYOTE SPRING OPTIONS

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
DDA											
Construction--COE--Contingency		643	2654	6569	13415	14839	14719	12047	5490		
A&CO		10	100	300	1250	4000	4300	4350	4350	100	
Total		653	2754	6869	14665	18839	19019	16397	9840	100	
OBTS/DAA/OB-1											
Construction--COE--Contingency		1392	2936	2762	2618	1565	1052				
A&CO		50	200	500	900	1250	1250	1250	1250	250	
Operations			39	234	2611	5677	7722	7722	7730	7730	7730
Total		1442	3175	3496	6129	8492	10024	8972	8980	7980	7730
OB-2											
Construction--COE--Contingency				179	1877	2156	1899	718			
A&CO							50				
Operations					31	246	1946	4497	5600	5600	5600
Total				179	1908	2402	3895	5215	5600	5600	5600
TOTALS											
Construction--COE--Contingency		2035	5590	9510	17910	18560	17670	12765	5490		
A&CO		60	300	800	2150	5250	5600	5600	5600	350	
Operations			39	234	2642	5923	9668	12219	13330	13330	13330
Onsite Totals		2095	5929	10544	22702	29733	32938	30584	24420	13680	13330
OFFSITE											
COE Salt Lake City	77	208	347	410	410	410	410	300	100	100	
A&CO Las Vegas	30	250	500	600	300	200	200	200	200	100	
Total Offsite	107	458	847	1010	710	610	610	500	300	200	
GRAND TOTAL	107	2553	6776	11554	23412	30343	33548	31084	24720	13880	13330

TABLE 2-7

Chapter 3

MX Task Force Manpower Requirements For the Utah/Ely Options

1. As with the Coyote Springs Options, the Task Force was requested to evaluate manpower requirements for a sequential construction approach using the boundaries of the 18 construction zones as shown on Figure 3-1 with the first operating base located at Beryl or Milford, Utah and second located at Ely, Nevada (Alternatives 3 and 5). Again, these geographical areas would be assumed to constitute the service area for each shelter construction plant with the number of clusters per area ranging from 6 to 19.

A. The reasons to vary the DEIS construction plan in these options are the same as previously discussed for the Coyote Spring options and will not be included here.

B. Based upon the foregoing and a need to develop a sequential construction approach, a revised construction plan was devised using the same assumptions as previously listed for the Coyote Spring options and will not be included here.

C. Using the assumptions referred to above, a construction sequence and schedule was established to provide for contiguous turnover of completed clusters emanating from the first operating base (Beryl or Milford) to the second base (Ely) and then to the boundaries of the deployment area. This sequence of construction also assumed six areas of simultaneous construction with plant moves as illustrated in Table 3-1. From a more complex construction schedule, a simplified schedule was superimposed over the DEIS construction schedule (Figure 3-1). Using the construction schedule and the same manpower criteria and factors developed for the Coyote Spring Options (Table 3-2),

manyears were then assigned to the DTN, life support camps, electrical systems, cluster roads, and shelter construction by calendar year and DEIS construction zone as shown in Table 3-3. Table 3-5 was developed by combining the A&CO manpower (Table 3-4) with the direct construction manpower along with their respective Corps of Engineer and contingency values. This table depicts manpower requirements for each construction zone by calendar year. Finally, the operational manpower from Table 3-6 was listed with all the foregoing information to develop the manpower summary in Table 3-7.

Construction Plant Move Sequence- Utah/Ely options						
		Sequence Number				Total Clusters Per Plant
		1	2	3	4	
Plant A	Zone	10	17	8	--	
	No. of Clusters	16	10	10	--	36
Plant B	Zone	9	13	--	--	
	No. of Clusters	17	19	--	--	36
Plant C	Zone	3	16	6	--	
	No. of Clusters	13	6	11	--	30
Plant D	Zone	4	14	11	1	
	No. of Clusters	11	6	8	11	36
Plant E	Zone	5	12	18	--	
	No. of Clusters	9	8	13	--	30
Plant F	Zone	2	15	7	--	
	No. of Clusters	13	9	10	--	32

TABLE 3-1

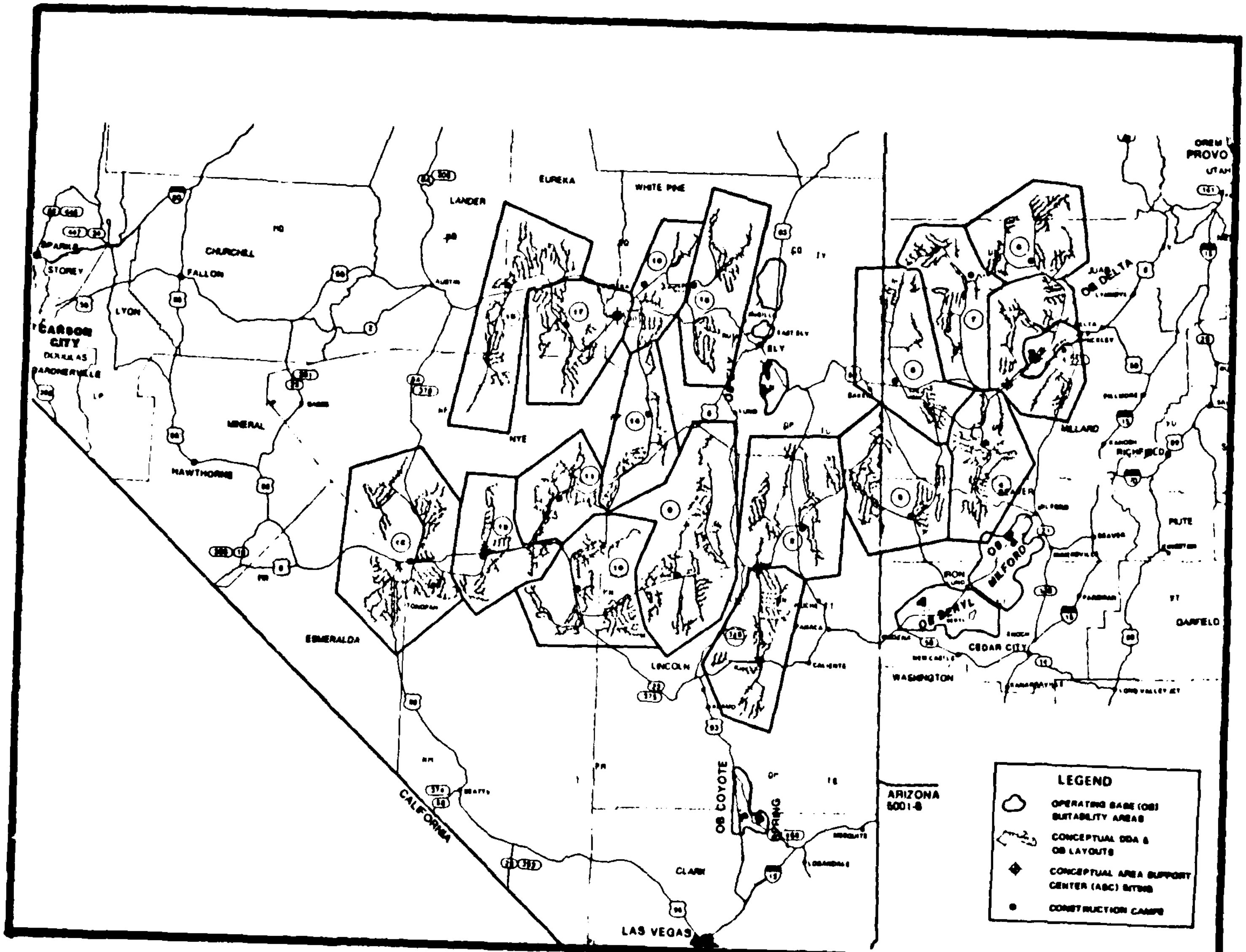


Figure 3-1 Construction Zones as depicted in the Deployment Area Selection and Land Withdrawl/Acquisition DEIS

DDA CONSTRUCTION SCHEDULE -- UTAH/ELY OPTIONS

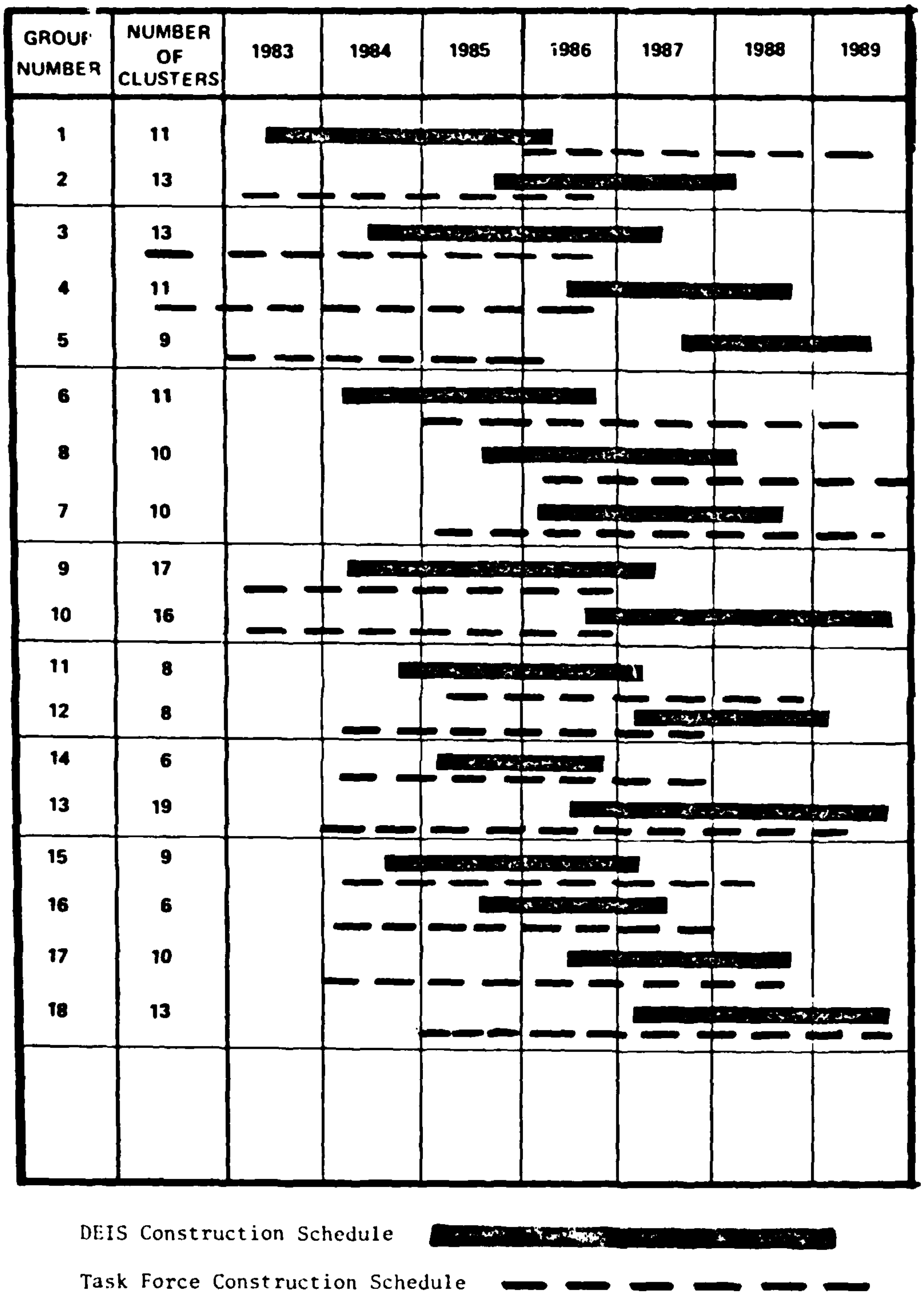


FIGURE 3-2

Manpower Factors, Utah/Ely Option														
Zone No.	No. of Clus	DTN, Initial Constr.			Camp Construction			Electrical			Cluster Roads			
		No. of Month	Man Month (@110/clu)	No. of MnYr	No. of Month	Man Month (@120/clu)	No. of MnYr	No. of Month	Man Months (@422/clu)	No. of MnYr	No. of Month	Man Months (@400/clu)	No. of MnYr
1	11	12	1210	101	12	1320	110	12	4642	387	12	4400	367
2	13	12	1430	120	12	1560	130	12	5486	457	12	5200	433
3	13	12	1430	120	12	1560	130	12	5486	457	12	5200	433
4	11	12	1210	101	12	1320	110	12	4642	387	12	4400	367
5	9	12	990	83	12	1080	90	12	3798	317	12	3600	300
6	11	12	1210	101	12	1320	110	12	4642	387	12	4400	367
7	10	12	1100	92	12	1200	100	12	4220	352	12	4000	333
8	10	12	1100	92	12	1200	100	12	4220	352	12	4000	333
9	17	12	1870	156	12	2040	170	12	7174	598	12	6800	576
10	16	12	1760	147	12	1920	160	12	6752	562	12	6400	534
11	8	12	880	73	12	960	80	12	3376	281	12	3200	267
12	8	12	880	73	12	960	80	12	3376	281	12	3200	267
13	19	12	2090	174	12	2280	190	12	8018	668	12	7600	633
14	6	12	660	55	12	720	60	12	2532	211	12	2400	200
15	9	12	990	83	12	1080	90	12	3798	317	12	3600	300
16	6	12	660	55	12	720	60	12	2532	211	12	2400	200
17	10	12	1100	92	12	1200	100	12	4220	352	12	4000	333
18	13	12	1430	120	12	1560	130	12	5486	457	12	5200	433
Total	200		22000			24000			84405			80000	

TABLE 3-2

Manpower Factors, Utah/Ely Option

Zone No.	No. of Clus	Construction Plant			Cluster Site Work			Road Finish			ASC Construction		
		No. of Month	Man Months (@900+/clu)	No. of MnYr	No. of Month	Man Months (1344+/clu)	No. of MnYr	No. of Month	Man Months (@105/clu)	No. of MnYr	No. of Month	Man Months (@1350 ea)	No. of MnYr
1	11	17	10000	833	19	14934	1245	3	1155	95	-	-	-
2	13	19	11176	931	21	16506	1375	3	1365	114	12	1350	112
3	13	19	11176	931	21	16506	1375	3	1365	114	-	-	-
4	11	17	10000	833	19	14934	1245	3	1155	95	-	-	-
5	9	14	8235	686	16	12576	1047	3	945	79	-	-	-
6	11	17	10000	833	19	14934	1245	3	1155	95	12	1350	112
7	10	16	9412	784	18	14148	1179	3	1050	88	-	-	-
8	10	16	9412	784	18	14148	1179	3	1050	88	-	-	-
9	17	24	14118	1176	26	20436	1703	3	1785	148	-	-	-
10	16	23	13529	1127	25	19650	1637	3	1680	142	-	-	-
11	8	13	7647	637	15	11790	983	3	840	70	-	-	-
12	8	13	7647	637	15	11790	983	3	840	70	12	1350	112
13	19	27	15882	1323	29	22794	1900	3	1995	165	-	-	-
14	6	11	6470	539	13	10218	852	3	630	53	-	-	-
15	9	14	8235	686	16	12576	1047	3	945	79			
16	6	11	6470	539	13	10218	851	3	630	53	12	1350	112
17	10	16	9412	784	18	14148	1179	3	1050	88	-	-	-
18	13	19	11176	931	21	16506	1375	3	1365	114	-	-	-
Total	200		180000			268800			21000			5400	

TABLE 3-2 Continued

Manyear Loading for Ely/Utah Option

	Zone	Clusters	1982				1983				1984				1985				1986			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	1	11																		101		
Camp Const.																					101	
Electrical																					83	
Cluster Roads																						
Const. Plant																						
Clust. Site Work																						
ASC																						
DTN	2	13						120														114
Camp Const.									120		10											
Electrical									98			131				131				98		
Cluster Roads													433									
Const. Plant														98		588			245			
Clust. Site Work														66			786			524		
ASC																	84		28			
DTN	3	13		119																	114	
Camp Const.				119			11															
Electrical					79			105				105				106				62		
Cluster Roads								433														
Const. Plant														98		588			245			
Clust. Site Work														66			786		521			
ASC																						
Total																						

	1987				1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN												96				
Camp Const.	9															
Electrical		111				111				82						
Cluster Roads			367													
Const. Plant							490			343						
Clust. Site Work							590			655						
ASC																
DTN																
Camp Const.																
Electrical																
Cluster Roads																
Const. Plant																
Clust. Site Work																
ASC																
DTN																
Camp Const.																
Electrical																
Cluster Roads																
Const. Plant																
Clust. Site Work																
ASC																
Total																

Table 3-3

Manyear Loading for Ely/Utah Option

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	4	11		101																	95																	
Camp Const.				101			9																															
Electrical					71			95				95				95			32																			
Cluster Roads								367																														
Const. Plant														147		588			98																			
Clust. Site Work														131			786			328																		
ASC																																						
DTN	5	9						83													79																	
Camp Const.									83		7																											
Electrical									77			103				103			34																			
Cluster Roads													300																									
Const. Plant														98		588																						
Clust. Site Work														65		785			195																			
ASC																																						
DTN	6	11															101														95							
Camp Const.																	101		9																			
Electrical																	79			106				106				97										
Cluster Roads																					367																	
Const. Plant																									392			441										
Clust. Site Work																									359			786										
ASC																									56			57										
Total																																						

Table 3-3 continued

Manyear Loading for Ely/Utah Option

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	7	10															92																		88					
Camp Const.																	92		8																				
Electrical																	66				88			88				88			22							
Cluster Roads																					333																	
Const. Plant																										147		588			49							
Clust. Site Work																										131		786			263							
ASC																																						
DTN	8	10																			92												88					
Camp Const.																					92		8															
Electrical																					81			108				108				54						
Cluster Roads																								333														
Const. Plant																												588			196							
Clust. Site Work																												721				459						
ASC																																						
DTN	9	17						156															149															
Camp Const.								156			14																											
Electrical									120				159			159				159																		
Cluster Roads												567																										
Const. Plant														147		588				141																		
Clust. Site Work														131			786			786																		
ASC																																						
Total																																						

Table 3-3 continued

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	10	16						147															142															
Camp Const.								147			13																											
Electrical									121			161				161				121																		
Cluster Roads												533																										
Const. Plant														147		588				392																		
Clust. Site Work														131		786				720																		
ASC																																						
DTN	11	8														73													70									
Camp Const.																73			7																			
Electrical																	70				94			94			23											
Cluster Roads																					267																	
Const. Plant																								539			98											
Clust. Site Work																									655			328										
ASC																																						
DTN	12	8										73													70													
Camp Const.												73			7																							
Electrical													70			94					94		23															
Cluster Roads																	267																					
Const. Plant																					490		147															
Clust. Site Work																					590		393															
ASC																					[illegible]		28															
Total																																						

Table 3-3 continued

Manyear Loading for Ely/Utah Option

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	13	19										174																				165						
Camp Const.													174		16																							
Electrical													96			127				127				127				127			64							
Cluster Roads																				533																		
Const. Plant																								588				588			147							
Clust. Site Work																								720				786			393							
ASC																																						
DTN	14	6										55													53													
Camp Const.												55			5																							
Electrical													53			70				70			18															
Cluster Roads																200																						
Const. Plant																					490		49															
Clust. Site Work																					589		262															
ASC																																						
DTN	15	9										83															79											
Camp Const.												83			7																							
Electrical													63			85				85				85														
Cluster Roads																300																						
Const. Plant																					245			441														
Clust. Site Work																						262		786														
ASC																																						
Total																																						

Table 3-3 continued

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DIN	16	6										55													53													
Camp Const.												55			5																							
Electrical													49			65				65			32															
Cluster Roads																200																						
Const. Plant																					343		196															
Clust. Site Work																						393		458														
ASC																					56			57														
DIN	17	10										92																88										
Camp Const.												92			8																							
Electrical													66			88				88				88			22											
Cluster Roads																	333																					
Const. Plant																						196		588														
Clust. Site Work																						196		786			196											
ASC																																						
DIN	18	13														120																	114					
Camp Const.																120			10																			
Electrical																	86			114				114				114			29							
Cluster Roads																					433																	
Const. Plant																									111			490										
Clust. Site Work																									523			786			65							
ASC																																						
Total																																						

Table 3-3 continued

Average A&CO Personnel

Ely/Utah Option

Zone	No. of Cluster	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	11							32	1084	
2	13			30	50	620				
3	13			30	50	1003	333			
4	11	10	100	60	1000	1381				
5	9			60	50	797				
6	11						26	498	386	
7	10						7	48	819	
8	10							44	855	100
9	17			60	50	43	1004			
10	16			60	50	39	1000			
11	8						37	620		
12	8					32	689	150		
13	19					7	44	198	1206	
14	6					32	515			
15	9					14	211	600		
16	6					21	359	300		
17	10					11	44	612		
18	13						31	1248		
1st OB/DAA		50	200	500	900	1450	1450	1450	1450	350
2nd OB							50			
Total		60	300	800	2150	5450	5800	5800	5800	450
Las Vegas*		250	500	600	300					
Grand Total		310	800	1400	2450	5450	5800	5800	5800	450

* There will be 30 A&CO personnel in Las Vegas in 1981

TABLE 3-4

Workforce Distribution Utah/Ely Option — Page 1 of 7

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	Construction					285	487	1191	1176	
	COE* and Contingency**					67	113	276	273	
	Subtotal					352	600	1467	1449	
	A&CO					--	--	32	1084	
	Total					352	600	1499	2260	
2	Construction		338	738	1589	1009				
	COE* and Contingency**		79	171	369	234				
	Subtotal		417	909	1958	1243				
	A&CO		--	30	50	620				
	Total		417	939	2008	1363				
3	Construction	317	549	269	1180	945				
	COE* and Contingency**	71	127	63	343	220				
	Subtotal	391	676	332	1823	1165				
	A&CO	--	--	30	50	1003	333			
	Total	391	676	362	1873	2168	333			

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 3-5

Workforce Distribution Utah/Ely Option

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
4	Construction	273	471	373	1169	553				
	COE* and Contingency**	63	109	86	341	128				
	Subtotal	336	580	459	1310	681				
	A&CO	10	100	60	1000	1381				
	Total	346	680	519	2310	2062				
5	Construction		243	573	1476	308				
	COE* and Contingency**		56	133	343	72				
	Subtotal		299	706	1819	380				
	A&CO		--	60	50	797				
	Total		299	766	1369	1177				
6	Construction				281	482	1013	1381	95	
	COE* and Contingency**				65	112	235	320	23	
	Subtotal				346	594	1248	1701	118	
	A&CO				--	--	26	498	386	
	Total				346	594	1274	2199	504	

* COE value obtained by multiplying Construction Worker estimates by .10 .

** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 3-5 continued

Workforce Distribution Utah/Ely Option										Page 3 of 7
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
7	Construction				250	429	366	1462	421	
	COE* and Contingency**				58	100	85	339	98	
	Subtotal				308	529	451	1801	519	
	A&CO				--	--	7	48	819	
	Total				308	529	458	1849	1338	
8	Construction					265	449	1417	797	
	COE* and Contingency**					62	104	329	185	
	Subtotal					327	553	1746	982	
	A&CO					--	--	44	855	100
	Total					327	553	1790	1837	100
9	Construction		432	1018	1533	1386	149			
	COE* and Contingency**		100	236	355	322	35			
	Subtotal		532	1254	1888	1708	184			
	A&CO		--	60	50	43	1004			
	Total		532	1314	1938	1751	1188			

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 3-5 continued

Workforce Distribution Utah/Ely Option										Page 4 of 7
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
10	Construction		415	985	1535	1233	142			
	COE* and Contingency**		97	229	357	286	33			
	Subtotal		512	1214	1892	1519	175			
	A&CO			60	50	39	1000			
	Total		512	1274	1942	1558	1175			
11	Construction				216	368	1288	519		
	COE* and Contingency**				51	86	299	121		
	Subtotal				267	454	1587	640		
	A&CO				--	--	37	620		
	Total				267	454	1624	1260		
12	Construction			216	368	1258	661			
	COE* and Contingency**			51	86	292	153			
	Subtotal			267	454	1550	814			
	A&CO			--	--	32	689	150		
	Total			267	454	1582	1503	150		

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 3-5 continued

Workforce Distribution Utah/Ely Option										Page 5 of 7
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
13	Construction			444	143	760	1435	1501	769	
	COE* and Contingency**			103	33	176	333	348	179	
	Subtotal			547	176	936	1768	1849	948	
	A&CO			--	--	7	44	198	1206	
	Total			547	176	943	1812	2047	2154	
14	Construction			163	275	1149	382			
	COE* and Contingency**			37	64	267	88			
	Subtotal			200	339	1416	470			
	A&CO			--	--	32	515			
	Total			200	339	1448	985			
15	Construction			229	392	592	1312	79		
	COE* and Contingency**			53	91	137	304	18		
	Subtotal			282	483	729	1616	97		
	A&CO			--	--	14	211	600		
	Total			282	483	733	1827	697		

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 3-5 continued

Workforce Distribution Utah/Ely Option										Page 6 of 7
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
16	Construction			159	270	857	796			
	COE* and Contingency**			37	63	198	185			
	Subtotal			196	333	1055	981			
	A&CO			--	--	21	359	300		
	Total			196	333	1076	1340	300		
17	Construction			250	429	480	1462	306		
	COE* and Contingency**			53	100	111	339	71		
	Subtotal			308	529	591	1801	377		
	A&CO			--	--	11	44	612		
	Total			308	529	602	1845	989		
18	Construction				326	557	1078	1390	208	
	COE* and Contingency**				76	130	250	322	48	
	Subtotal				402	687	1328	1712	256	
	A&CO				--	--	31	1248	--	
	Total				402	687	1359	2960	256	

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 3-5 continued

Workforce Distribution Utah/Ely Option

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
DDA GRAND TOTAL	Construction	590	2448	5417	12068	12916	11020	9246	3466	
	COE* and Contingency**	137	568	1257	2759	3000	2556	2144	806	
	Subtotal	727	3016	6674	14827	15916	13576	11390	4272	
	A&CO	10	100	300	1250	4000	4300	4350	4350	100
	Total	737	3116	6974	16077	19916	17876	15740	8622	100
	Construction									
	COE* and Contingency**									
	Subtotal									
	A&CO									
	Total									
	Construction									
	COE* and Contingency**									
	Subtotal									
	A&CO									
	Total									

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 3-5 continued

OPERATIONAL WORK FORCE Utah/Ely Option									
	1982	1983	1984	1985	1986	1987	1988	1989	1990*
OPERATING BASE 1									
OFFICERS		10	34	224	487	610	610	610	
ENLISTED		27	148	1907	4342	5900	5900	5900	
CIVILIANS		2	52	480	848	1212	1212	1220	
TOTAL		39	234	2611	5677	7722	7722	7730	
OPERATING BASE 2									
OFFICERS				5	12	166	262	290	
ENLISTEL				24	170	1513	3416	4275	
CIVILIANS				2	64	267	819	1035	
TOTAL				31	246	1946	4497	5600	
TOTAL WORK FORCE		39	234	2642	5923	9668	12219	13330	

* Population in 1990 and subsequent years are the same as 1989

TABLE 3-6

MANPOWER SUMMARY UTAH-ELY OPTION

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
DDA											
Construction--COE-Contingency		727	3016	6674	14827	15916	13576	11390	4272		
A&CO		10	100	300	1250	4000	4300	4350	4350	100	
Total		737	3116	6974	16077	19916	17876	15740	8622	100	
OBTS/DAA/OB-1											
Construction--COE--Contingency		1392	2936	2762	2618	1565	1052				
A&CO		50	200	500	900	1450	1450	1450	1450	350	
Operations		--	39	234	2611	5677	7722	7722	7730	7730	7730
Total		1442	3175	3496	6129	8692	10224	9172	9180	8080	7730
OB-2											
Construction--COE--Contingency				179	1877	2156	1899	718			
A&CO							50				
Operations					31	246	1946	4497	5600	5600	5600
Total				179	1908	2402	3895	5215	5600	5600	5600
TOTALS											
Construction--COE--Contingency		2119	5952	9615	19322	19637	16527	12108	4272		
A&CO		60	300	800	2150	5450	5800	5800	5800	450	
Operations			39	234	2642	5923	9668	12219	13330	13330	13330
Total		2179	6291	10649	24114	31010	31995	30127	23402	13780	13330
OFFSITE											
A&CO Las Vegas	30	250	500	600	300						
COE Salt Lake City	77	208	347	410	410	410	410	300	100	100	
Total offsite	107	458	847	1010	710	410	410	300	100	100	
GRAND TOTAL	107	2637	7138	11659	24824	31420	32405	30427	23502	13880	13330

TABLE 3-7

Chapter 4

MX Task Force Manpower Requirements for Split Basing

1. For split basing, the Task Force developed the manpower requirements for a sequential construction approach using the boundaries of the 8 geographical areas as shown on Figure 4-1a for 100 clusters in Nevada/Utah and the boundaries of the 7 geographical areas shown on Figure 4-1b for 100 clusters in Texas/New Mexico. Operating bases were located at Coyote Spring, Nevada and Clovis, New Mexico as described in alternative 8 of the DEIS. As in previous exercises, these construction zones were assumed to constitute the service area for each shelter construction plant with the number of clusters per area ranging from 9 to 17 in Nevada/Utah and 12 to 16 in Texas/New Mexico.

A. The reasons to change the DEIS construction plan in this option are similar to those previously discussed and will not be included here.

B. Based upon the foregoing and a need to develop a sequential construction area approach, a revised construction plan was devised using similar assumptions as previously listed for the Coyote Spring options. In order to develop a viable construction plan for the split basing plan, further assumptions had to be made. These assumptions are broken down into three catagories; (1) those affecting both bases, (2) those affecting Nevada/Utah only, (3) those affecting Texas/New Mexico.

(1) Both Bases

a. IOC will be at the Nevada/Utah site.

b. Both bases must start at approximately the same time to meet FOC.

c. Both bases will require an Alternate Operational Control Center (AOCC).

d. Both bases will be of the same size.

e. The DAA as it is now defined will be located at both bases.

f. The AOCC will be located at an ASC.

g. The additional manpower required to construct an AOCC/ASC is equal to the manpower to construct two clusters.

(2) Nevada/Utah

a. The AOCC will be located at the ASC in Zone 5 near Delta, Utah and north of Highways 6 & 50. The site is remote from the operating base and has access to an established community and transportation network.

b. The AOCC will be scheduled with the work in Zone 4.

(3) Texas/New Mexico

a. The operating base will not include a new runway but will include all other aircraft service & maintenance facilities.

b. The AOCC will be located in Zone 6 which is northeast of Tucumcari, New Mexico near Highway 54. This site is also remote from the operating base and has access to a transportation network.

c. The AOCC will be scheduled with the work in Zone 4.

C. Based upon these assumptions, a sequence of construction was established for contiguous turnover of completed clusters in each deployment area emanating from the OB's and then to the boundaries of the deployment areas. This sequence again assumes six areas under construction simultaneously with three in Nevada/Utah and three in Texas/New Mexico. The sequence of plant moves is depicted in Table 4-1. Plants A through C are located in Nevada/Utah and Plants D through F will be in Texas/New Mexico. The associated construction schedule changes are shown in Figures 4-2a and 4-2b.

D. As in the Coyote Spring Options, the number of manmonths per cluster was established and assigned to each work item; i.e., the construction of the initial DTN Roads, Life Support Camps, Electrical Systems, Cluster Roads, Shelter Plants (fabrication) Shelter Sitework (installation), Road Finishing and ASC's for split basing as depicted in Tables 4-2a and 4-2b.

E. Using the developed construction schedule and manpower parameters, manyears were then assigned to the work items by calendar year and construction zone as shown Table 4-3a and 4-3b. Direct construction, Corps and contingency manpower manyears, were combined with the A&CO manpower figures shown in Table 4-4a and 4-4b to arrive at the totals, by calendar year and construction zone as shown on Tables 4-5a and 4-5b. Operational manpower figures as shown in Table 4-6 were then added to the previously computed manpower for the OB/DAA/OBTS complexes and offsite locations to reflect the grand totals for each basing location as shown in Tables 4-7a and 4-7b. A composite manpower summary from the two geographical areas of split basing is summarized in Table 4-8.

Construction Plant Move Sequence- Split Basing option						
		Sequence Number				Total Clusters Per Plant
NEVADA/UTAH		1	2	3	4	
Plant A	Zone	1	4	8		
	No. of Clusters	10	15	9		34
Plant B	Zone	2	6			
	No. of Clusters	12	17			29
Plant C	Zone	3	5	7		
	No. of Clusters	13	10	14		37
TEXAS/NEW MEXICO						
Plant D	Zone	2	1	7		
	No. of Clusters	15	12	12		39
Plant E	Zone	5	6			
	No. of Clusters	16	15			31
Plant F	Zone	3	4			
	No. of Clusters	15	15			30

Table 4-1

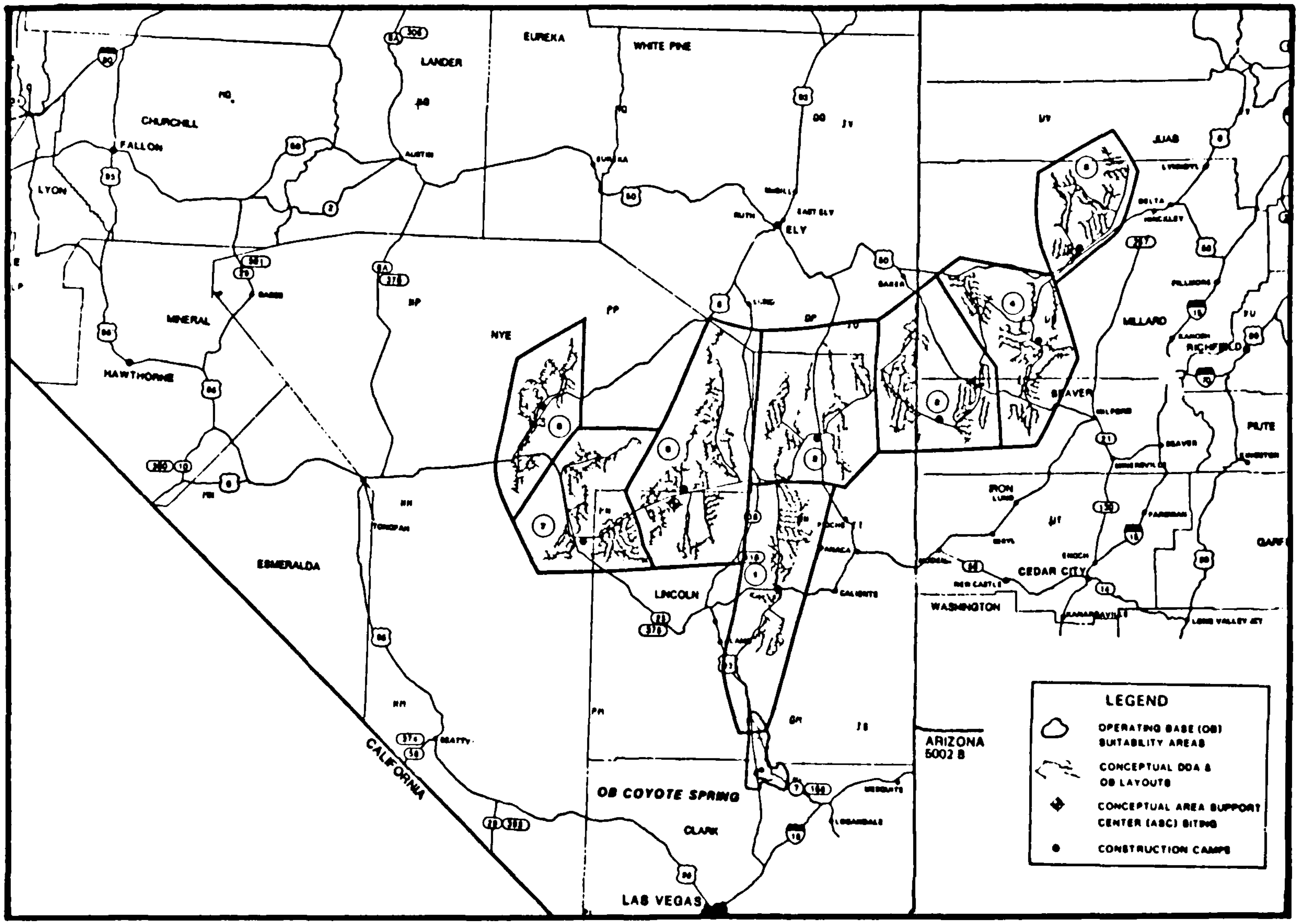


Figure 4-1a Construction Zones as depicted in the Deployment Area Selection and Land Withdrawal/Acquisition DEIS

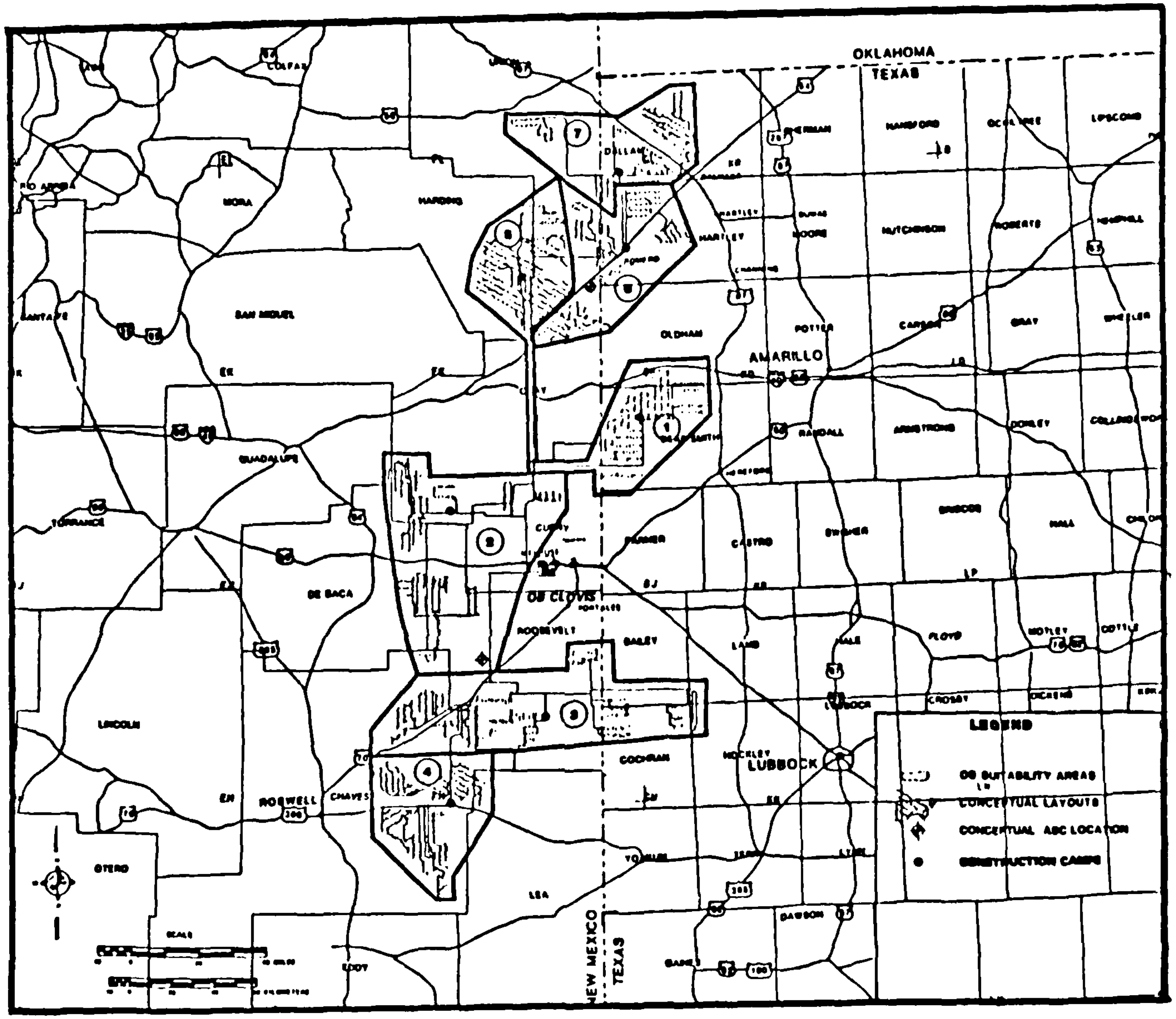
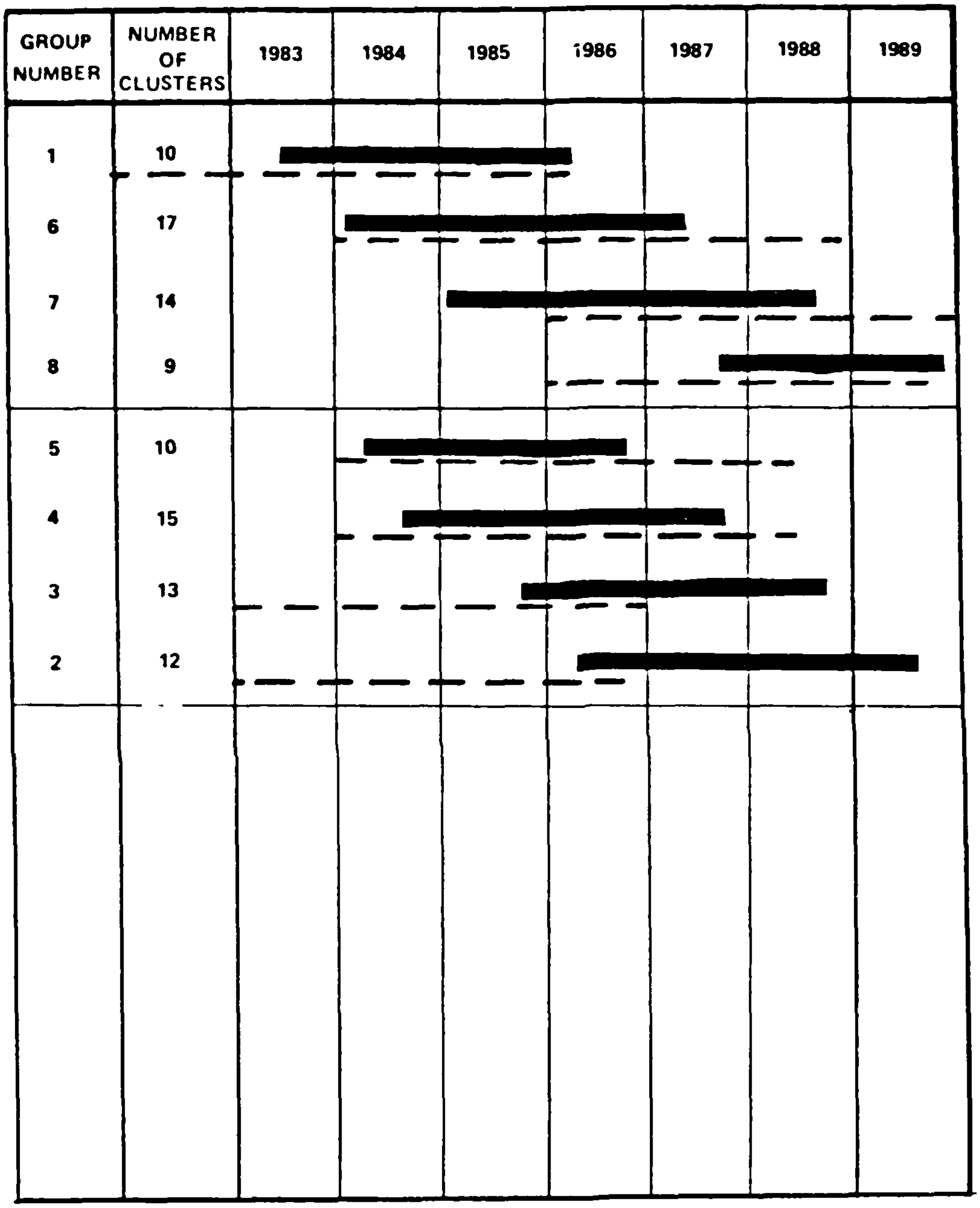


Figure 4-1b Construction Zones as depicted in the Deployment Area Selection and Land Withdrawal/Acquisition DEIS

DDA Construction Schedule--Nevada/Utah Split Basing

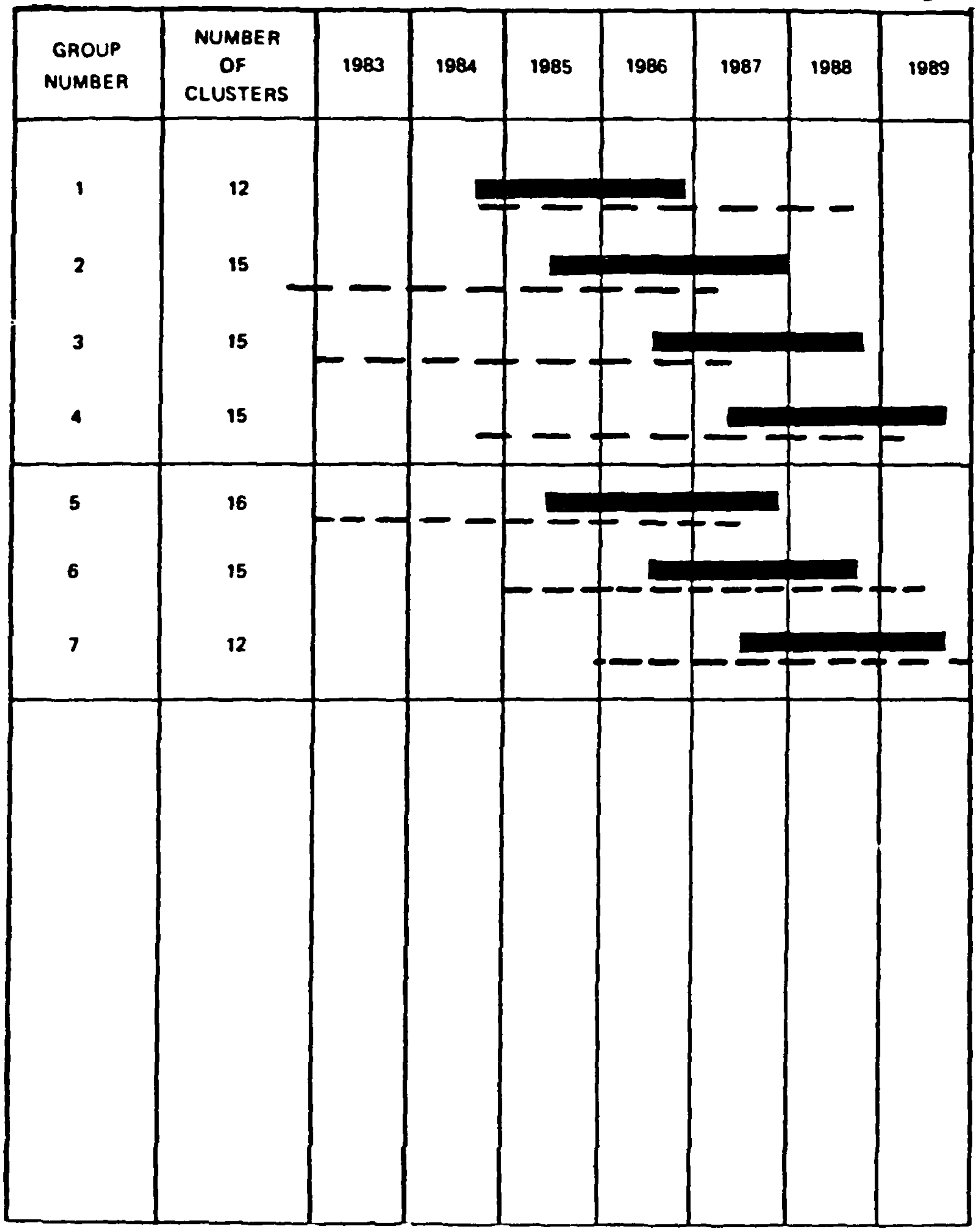


DEIS Construction Schedule

Task Force Construction Schedule

Figure 4-2a

DDA Construction Schedule--Texas/New Mexico Split Basing



DEIS Construction Schedule

Task Force Construction Schedule

Figure 4-2b

Manpower Factors, Split Basing-- Nevada/Utah														
Zone No.	No. of Clust	DTN, Initial Constr.			Camp Construction			Electrical			Cluster Roads			
		No. of Month	Man Months @111±/clu)	No. of MnYr	No. of Month	Man Month @107±/clu)	No. of MnYr	No. of Month	Man Months (@423±/clu	No. of MnYr	No. of Month	Man Months (@400±/clu)	No. of MnYr
1	10	12	1110	93	12	1070	89	12	4236	353	12	4000	333
2	12	12	1332	111	12	1284	107	12	5076	423	12	4800	400
3	13	12	1443	120	12	1391	116	12	5499	458	12	5200	433
4	15	12	1665	139	12	1605	134	12	6345	529	12	6000	500
5	10	12	1110	93	12	1070	89	12	4230	533	12	4000	333
6	17	12	1887	157	12	1819	152	12	7191	599	12	6800	567
7	14	12	1554	129	12	1498	125	12	5922	493	12	5600	467
8	9	12	999	83	12	963	80	12	3807	317	12	3600	300
Total	Man	Months	11100			10700			42300			40000	
Total	Man	Years		925			892			3525			3333

Table 4-2a

Manpower Factors, Split Basing-Nevada/ Utah													
Zone No.	No. of Clus	Construction Plant			Cluster Site Work			Road Finish			ASC Construction		
		No. of Month	Man Months (@900±/clu)	No. of MnYr	No. of Month	Man Months (1306±/clu)	No. of MnYr	No. of Month	Man Months (@106±/clu)	No. of MnYr	No. of Month	Man Months (1350±/clu)	No. of MnYr
1	10	16	9600	800	18	14161	1180	3	1060	88	--	--	--
2	12	18	10800	900	20	15735	1311	3	1272	106	--	--	--
3	13	19	11400	950	21	16522	1377	3	1378	115		1350	112
4	15	22	13200	1100	24	18882	1573	3	1590	133		4050	339
5	10	16	9600	800	18	14161	1180	3	1060	88	--	--	--
6	17	24	14400	1200	26	20456	1705	3	1802	150		1350	112
7	14	21	12600	1050	23	18095	1508	3	1484	124	--	--	--
8	9	14	8400	700	16	12588	1049	3	954	79	--	--	--
Total	Man Months		90000			130600			10600			6750	
Total	Man Years			7500			10883			883			563

Table 4-2a Continued

Manpower Factors, Split Basing--Texas/New Mexico

Zone No.	No. of Clust	DTN Initial Constr			Camp Construction			Electrical			Cluster Roads		
		No. of Month	Man Months (@122±/clu)	No. of MnYr	No. of Month	Man Months (@94±/clu)	No. of MnYr	No. of Month	Man Months (@399+/clu)	No. of MnYr	No. of Month	Man Months (@383±/clu)	No. of MnYr
1	12	12	1464	122	12	1128	94	12	4788	399	12	4596	383
2	15	12	1830	152	12	1410	118	12	5985	499	12	5745	479
3	15	12	1830	153	12	1410	117	12	5985	499	12	5745	478
4	15	12	1830	152	12	1410	118	12	5985	499	12	5745	479
5	16	12	1952	163	12	1504	125	12	6384	532	12	6128	511
6	15	12	1830	153	12	1410	117	12	5985	498	12	5745	479
7	12	12	1464	122	12	1128	94	12	4788	399	12	4596	383
Total	Man	Month	12200			9400			39900			38300	
Total	Man	Years		1017			783			3325			3192

Table 4-2b

Manpower Factors, Split Basing--Texas/New Mexico

Zone No.#	No.# of Clust	Construction Plant			Cluster Site Work			Road Finish			ASC Construction		
		No.of Month	Man Months (@900±/clu)	No.of MnYr	No.of Month	Man Months (@1266/clu)	No.of MnYr	No.of Month	Man Months (@94±/clu)	No.of MnYr	No.of Month	Man Months (@1350/clu)	No.of MnYr
1	12	18	11021	919	20	15727	1310	3	1128	94	--	--	--
2	15	22	13469	1122	24	18872	1573	3	1410	117		1350	112
3	15	22	13469	1122	24	18872	1573	3	1410	118	--	--	--
4	15	22	13469	1122	24	18872	1573	3	1410	117	--	--	--
5	16	23	14082	1174	25	19658	1638	3	1504	125	AOCC	4050	339
6	15	22	13469	1122	24	18872	1573	3	1410	118	--	--	--
7	12	18	11021	919	20	15727	1310	3	1128	94	--	--	--
Total	Man	Months	90000			126600			9400			5400	
Total	Man	Tears		7500			10550			783			451

Table 4-2b Continued

Manyear Loading for Split Base Option-- Nevada/Utah

	Zone	Clusters	1982				1983				1984				1985				1986			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	1	10		93																88		
Camp Const.					82		7															
Electrical					66			88				88				88			23			
Cluster Roads								333														
Const. Plant														150		600			50			
Clust. Site Work														131			787		262			
ASC																						
DTN	2	12							111												106	
Camp Const.									98		9											
Electrical									98			130				130				65		
Cluster Roads													400									
Const. Plant														100			600		200			
Clust. Site Work														66			787			458		
ASC																						
DTN	3	13						120														115
Camp Const.								106			10											
Electrical									98			131				131				98		
Cluster Roads												433										
Const. Plant														50		600				300		
Clust Site Work																787				590		
ASC																	56			56		
Total																						

	1987				1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN																
Camp Const.																
Electrical																
Cluster Roads																
Const. Plant																
Clust. Site Work																
ASC																
DTN																
Camp Const.																
Electrical																
Cluster Roads																
Const. Plant																
Clust. Site Work																
ASC																
DTN																
Camp Const.																
Electrical																
Cluster Roads																
Const. Plant																
Clust Site Work																
ASC																
Total																

Table 4-3a

Manyear Loading for Split Base Option-- Nevada/Utah

	Zone	Clusters	1982				1983				1984				1985			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DIN	4	15										139						
Camp Const.												123			11			
Electrical													101			135		
Cluster Roads																	500	
Const. Plant																		
Clust. Site Work																		
ASC *																	169	
DIN	5	10										93						
Camp Const.												82			7			
Electrical													71			94		
Cluster Roads																	333	
Const. Plant																		
Clust. Site Work																		
ASC																		
DIN	6	17											157					
Camp Const.													139		13			
Electrical													106			141		
Cluster Roads																567		
Const. Plant																		
Clust. Site Work																		
ASC																		
Total																		

	986				1987				1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DIN										133										
Camp Const.																				
Electrical		135				135			23											
Cluster Roads																				
Const. Plant			550			550														
Clust. Site Work			660			787			126											
ASC *		170																		
DIN										88										
Camp Const.																				
Electrical		94				94														
Cluster Roads																				
Const. Plant			300			500														
Clust. Site Work			330				787		70											
ASC																				
DIN												150								
Camp Const.																				
Electrical		141				141				70										
Cluster Roads																				
Const. Plant			400			600			200											
Clust. Site Work			459			787				459										
ASC						112														
Total																				

*ASC with AOCC

Table 4-3a continued

Manyear Loading for Split Base Option -- Nevada/Utah

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DIN	[illegible]	14																		129														123				
Camp Const.																					11		10															
Electrical																					106			111				141				106						
Cluster Roads																								167														
Const. Plant																										100		600				550						
Inst. Site Work																										66			781			650						
A&C																																						
DIN	8	9																		83													29					
Camp Const.																					73		7															
Electrical																					9			106				106			26							
Cluster Roads																								500														
Const. Plant																										50		600			50							
Inst. Site Work																												787			262							
A&C																																						
DIN																																						
Camp Const.																																						
Electrical																																						
Cluster Roads																																						
Const. Plant																																						
Clust. Site Work																																						
A&C																																						
Total																																						

Table 4-3a continued

Manyear Loading for Split Base Option-- Texas/New Mexico

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	1	12											31				91													94									
Camp Const.													16				78																						
Electrical																	122				122				122				33										
Cluster Roads																	96				287																		
Const. Plant																					153				612				154										
Clust. Site Work																					131				786				393										
ASC																																							
DTN	2	15						114															117																
Camp Const.					38			98																															
Electrical					20			133					133				133				100																		
Cluster Roads								120					359																										
Const. Plant													51				612				159																		
Clust. Site Work																	786				787																		
ASC																					112																		
DTN	3	15						153																118															
Camp Const.								107					10																										
Electrical								100					133				133				133																		
Cluster Roads													478																										
Const. Plant																	561				561																		
Clust. Site Work																	655				786			132															
ASC																																							
Total																																							

Table 4-3b

Manyear Loading for Split Base Option -- Texas/New Mexico

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DIN	[illegible]	[illegible]											[illegible]				111															17							
Camp Const.													20				[illegible]																						
Electrical																	133				13				133			100											
Cluster Roads																	120				[illegible]																		
Const. Plant																					54				612			151											
Clust. Site Work																									786			78											
ASC																																							
DIN	[illegible]	16						16																125															
Camp Const								21					16																										
Electrical								11					11				112				13																		
Cluster Roads													11																										
Const. Plant																	612				[illegible]																		
Clust. Site Work																	751				[illegible]			131															
ASC *																					[illegible]																		
DIN	[illegible]	[illegible]															135																110						
Camp Const.																	107			10																			
Electrical																	99				[illegible]				133				133										
Cluster Roads																					[illegible]																		
Const. Plant																									612				510										
Clust. Site Work																									[illegible]				[illegible]				67						
ASC																																							
Total																																							

* ASC with AOCC

Table 4-3b continued

Manyear Loading for Split Base Option-- Texas/New Mexico

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	7	12																			122															94				
Camp Const																					86			8																
Electrical																					86				114			114				85							
Cluster Roads																									287			96											
Const. Plant																												160				459							
Clust. Site Work																												524				786							
ASC																																							
DTN																																							
Camp Const.																																							
Electrical																																							
Cluster Roads																																							
Const. Plant																																							
Clust. Site Work																																							
ASC																																							
DTN																																							
Camp Const.																																							
Electrical																																							
Cluster Roads																																							
Const. Plant																																							
Clust. Site Work																																							
ASC																																							
Total																																							

Table 4-3b continued

AVERAGE A&CO PERSONNEL
SPLIT BASE OPTION, NEVADA/UTAH

Zone	No. of Cluster	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	10	10	100	150	1050	1277				
2	12			100	100	1715				
3	13			50	100	480	1032			
4	15					71	1301	715		
5	10					37	613	706		
6	17					50	97	1458	349	
7	14						9	106	1395	70
8	9							106	1046	
OB/DAA		50	200	500	900	1130	880	880	880	178
Total		60	300	800	2150	4760	3932	3971	3670	248
Las Vegas*		216	450	500	245	150	150	150	150	75
GRAND TOTAL		276	750	1300	2395	4910	4082	4121	3820	323

* Las Vegas will have 30 A&CO personnel in 1981

TABLE 4-4a

AVERAGE A&CO PERSONNEL
SPLIT BASE OPTION, TEXAS/NEW MEXICO

Zone	No. of Clusters	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	12					15	90	1557		
2	15	5	50	150	109	2215	559			
3	15				91	95	1133	378		
4	15						90	1417	402	
5	16				100	95	1513			
6	15						83	95	1404	
7	12							63	1404	80
OB/DAA		25	100	250	450	750	1050	1000	1000	202
Total		30	150	400	750	3170	4518	4510	4210	282
Amarillo, TX		160	300	400	205	150	150	150	150	75
GRAND TOTAL		190	450	800	955	3320	4668	4660	4360	357

TABLE 4-4b

Workforce Distribution	Split Base Option Nevada/Utah									Page 1 of 6
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	Construction	241	428	369	1475	423				
	COE* and Contingency**	56	100	86	343	98				
	Subtotal	297	528	455	1818	521				
	A&CO	10	100	150	1050	1277				
	Total	307	628	605	2868	1798				
2	Construction		307	705	1517	829				
	COE* and Contingency**		72	164	352	192				
	Subtotal		379	869	1869	1021				
	A&CO		--	100	100	1715				
	Total		379	969	1969	2736				
3	Construction		324	624	1574	1159				
	COE* and Contingency**		75	144	365	269				
	Subtotal		399	768	1939	1428				
	A&CO		--	50	100	480	1032			
	Total		399	818	2039	1908	1032			

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 4-5a

Workforce Distribution Split Base Option Nevada/Utah

	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
4	Construction			363	815	1515	1472	282		
	COE* and Contingency**			84	190	352	341	65		
	Subtotal			447	1005	1867	1813	347		
	A&CO			--	--	71	1301	715		
	Total			447	1005	1938	3114	1062		
5	Construction			246	434	724	1381	158		
	COE* and Contingency**			58	100	168	320	37		
	Subtotal			304	534	892	1701	195		
	A&CO			--	--	37	613	706		
	Total			304	534	929	2314	901		
6	Construction			402	721	1000	1640	879		
	COE* and Contingency**			93	167	232	380	204		
	Subtotal			495	888	1232	2020	1083		
	A&CO			--	--	50	97	1458	349	
	Total			495	888	1282	2117	2541	349	

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 4-5a continued

Workforce Distribution Split Base Option Nevada/Utah

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
7	Construction					350	784	1528	1236	
	COE* and Contingency**					81	181	355	287	
	Subtotal					431	965	1883	1523	
	A&CO					--	9	106	1395	70
	Total					431	974	1989	2918	70
8	Construction					235	463	1493	417	
	COE* and Contingency**					55	107	346	97	
	Subtotal					290	570	1839	514	
	A&CO					--	--	106	1046	
	Total					290	570	1945	1560	
	NEVADA / UTAH TOTALS									
	Construction	241	1059	2709	6536	6235	5740	4340	1653	
	COE* and Contingency**	56	247	629	1517	1447	1329	1007	384	
	Subtotal	297	1306	3338	8053	7682	7069	5347	2037	
	A&CO	10	100	300	1250	3630	3052	3091	2790	70
	Total	307	1406	3638	9303	11312	10121	8438	4827	70

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 4-5a continued

Workforce Distribution	Split Base Option Texas/New Mexico								Page 4 of 6	
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	Construction			47	387	693	1520	674		
	COE* and Contingency**			11	90	161	353	156		
	Subtotal			58	477	854	1873	830		
	A&CO			--	--	15	90	1557		
	Total			58	477	869	1963	2387		
2	Construction	58	465	543	1531	1458	117			
	COE* and Contingency**	13	108	126	355	339	27			
	Subtotal	71	573	669	1886	1797	144			
	A&CO	5	50	150	109	2215	559			
	Total	76	623	819	1995	4012	703			
3	Construction		360	621	1349	1480	250			
	COE* and Contingency**		84	144	313	343	58			
	Subtotal		444	765	1662	1823	308			
	A&CO		--	--	91	95	1133	378		
	Total		444	765	1753	1918	1441	378		

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 4-5b

Workforce Distribution	Split Base Option Texas/New Mexico								Page 5 of 6	
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
4	Construction			58	465	543	1531	1346	117	
	COE* and Contingency**			13	108	126	355	313	27	
	Subtotal			71	573	669	1886	1659	144	
	A&CO			--	--	--	90	1417	402	
	Total			71	573	669	1976	3076	546	
5	Construction		384	663	1475	1829	256			
	COE* and Contingency**		89	154	342	424	60			
	Subtotal		473	817	1817	2253	316			
	A&CO		--	--	100	95	1513			
	Total		473	817	1917	2348	1829			
6	Construction				359	622	1465	1429	185	
	COE* and Contingency**				83	144	340	332	43	
	Subtotal				442	766	1805	1761	228	
	A&CO				--	--	83	95	1404	
	Total				442	766	1888	1856	1632	

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 4-5b continued

Workforce Distribution Split Base Option Texas/New Mexico

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
7	Construction					294	409	1194	1424	
	COE* and Contingency**					68	95	276	331	
	Subtotal					362	504	1470	1755	
	A&CO					--	--	63	1404	80
	Total					362	504	1533	3159	80
	Texas/New Mexico Totals									
	Construction	58	1209	1932	5566	6919	5548	4643	1726	
	COE* and Contingency**	13	281	448	1291	1605	1288	1077	401	
	Subtotal	71	1490	2380	6857	8524	6836	5720	2127	
	A&CO	5	50	150	300	2420	3468	3510	3210	80
	Total	76	1540	2530	7157	10944	10304	9230	5337	80
	DDA GRAND TOTAL									
	Construction	299	2268	4641	12102	13154	11288	8983	3379	--
	COE* and Contingency**	69	528	1077	2808	3052	2617	2084	785	--
	Subtotal	368	2796	5718	14910	16206	13905	11067	4164	--
	A&CO	15	150	450	1550	6050	6520	6601	6000	150
	Total	383	2946	6168	16460	22256	20425	17668	10164	150

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 4-5b continued

OPERATIONAL WORK FORCE SPLIT BASE OPTION--(NV/UT)/(TX/NM)

	1982	1983	1984	1985	1986	1987	1988	1989	1990 *
OPERATING BASE 1									
OFFICERS		10	34	224	587	736	736	736	
ENLISTED		27	148	1907	4801	6398	6398	6398	
CIVILIANS		2	52	180	856	1220	1220	1220	
TOTAL		39	234	2611	6247	8354	8354	8354	
OPERATING BASE 2									
OFFICERS				5	12	172	291	316	
ENLISTED				24	170	1777	3739	4646	
CIVILIANS				2	64	267	819	1030	
TOTAL				31	246	2216	4849	5992	
TOTAL WORK FORCE		39	234	2642	6493	10570	13203	14346	

* Population in 1990 and subsequent years are the same as 1989

TABLE 4-6

MANPOWER SUMMARY SPLIT BASING OPTION - NEVADA/UTAH	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
HDA											
Construction--COE--Contingency		297	1306	3338	8053	7682	7069	5347	2037		
A&CO		10	100	300	1250	3630	3052	3091	2790	70	
Total		307	1406	3638	9303	11312	10121	8438	4827	70	
PAA/OBTS/OB-1											
Construction--COE--Contingency		1392	2936	2762	2618	1565	1052				
A&CO		50	200	500	900	1130	880	880	880	178	
Operations			39	234	2611	6247	8354	8351	8351	8351	8351
Total		1442	3175	3496	6129	8942	10286	9231	9231	8532	8351
TOTALS											
Construction--COE--Contingency		1689	4242	6100	10671	9247	8121	5347	2037		
A&CO		60	300	800	2150	4760	3932	3971	3670	248	
Operations			39	234	2611	6247	8354	8351	8351	8351	8351
Total		1749	4581	7134	15432	20254	20407	17672	14061	8602	8351
OFFSITE											
A&CO Las Vegas	30	216	450	500	245	150	150	150	150	75	
COE Salt Lake City	48	130	217	256	256	256	256	188	63	63	
Total offsite	78	346	667	756	501	406	406	338	213	138	
TOTAL	78	2095	5248	7890	15933	20660	20813	18010	14274	8740	8351

TABLE 4-7a

MANPOWER SUMMARY SPLIT BASE OPTION - TEXAS/NEW MEXICO

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
DDA											
Construction--COE--Contingency		71	1490	2380	6857	8524	6836	5720	2127		
AGCO		5	50	150	300	2420	3463	3510	3210	80	
Total		76	1540	2530	7157	10944	10304	9231	5337	80	
DAA/OBTS/OB-2											
Construction--COE--Contingency		1392	2755	2762	2618	1565	1052				
AGCO		25	100	250	450	750	1050	1000	1000	202	
Operations					31	246	2216	4819	5992	5992	5992
Totals		1417	2855	3012	3099	2561	4318	5819	6992	6194	5992
TOTALS											
Construction--COE--Contingency		1463	4245	5142	9475	10089	7888	5720	2127		
AGCO		30	150	400	750	3170	4518	4510	4210	282	
Operations					31	246	2216	4849	5992	5992	5992
Totals		1493	4395	5542	10256	13505	14622	15079	12329	6274	5992
OFFSITE											
AGCO Amarillo		160	300	400	205	150	150	150	150	75	
COE Clovis	48	130	217	256	256	256	256	188	63	63	
Total offsite	48	290	517	656	461	406	406	338	213	138	
TOTAL	48	1783	4912	6198	10717	13911	15028	15417	12542	6412	5992

TABLE 4-7b

MANPOWER SUMMARY SPLIT BASING OPTION

	1981	1982	1982	1984	1985	1986	1987	1988	1989	1990	1991
DDA											
Construction--COE--Contingency T/N		71	1490	2380	6857	8524	6836	5720	2127		
Construction--COE--Contingency N/U		297	1306	3338	8053	7682	7069	5347	2037		
A&CO T/N		5	50	150	300	2420	3468	3510	3210	80	
A&CO N/U		10	100	300	1250	3630	3052	3091	2790	70	
Total		383	2946	6168	16460	22256	20425	17668	10164	150	
DAA/OBTS/OB-1,-2											
Construction--COE--Contingency T/N		1392	2755	2762	2618	1565	1052				
Construction--COE--Contingency N/U		1392	2936	2762	2618	1565	1052				
A&CO T/N		25	100	250	450	750	1050	1000	1000	202	
A&CO N/U		50	200	500	900	1130	880	880	880	178	
Operations T/N		--	--	--	31	246	2216	4849	5992	5992	5992
Operations N/U		--	39	234	2611	6247	8354	8354	8354	8354	8354
Total		2859	6030	6508	9228	11503	14604	15083	16226	14726	14316
TOTALS											
Construction--COE--Contingency		3152	8487	11242	20146	19336	16009	11067	4164		
A&CO		90	450	1200	2900	7930	8450	8481	7880	530	
Operations		--	39	234	2642	6493	10570	13203	14346	14316	14346
Total		3242	8976	12676	25688	33759	35029	32751	26390	14876	14346
OFFSITE											
COE Texas/New Mexico	48	130	217	256	256	256	256	188	63	63	
COE Nevada/Utah	48	130	217	256	256	256	256	188	63	63	
A&CO Texas/New Mexico		160	300	400	205	150	150	150	150	75	
A&CO Nevada/Utah	30	216	450	500	245	150	150	150	150	75	
Total offsite	126	636	1184	1412	962	812	812	676	426	276	
GRAND TOTAL	126	3878	10160	14088	26650	34571	35841	33427	26816	15152	14316

TABLE 4-8

Chapter 5

MX Task Force Manpower Requirements for Clovis Option with Texas/New Mexico Full Basing

To address the DEIS alternative 7, the Task Force evaluated the manpower requirements for a sequential construction approach using the boundaries of the 15 geographical areas shown on Figure 5-1 with the first operating base located at Clovis, New Mexico and the second base at Dalhart, Texas. Again as in the other options, these geographical areas are assumed to constitute the service area for each shelter construction plant with the number of clusters per area ranging from 8 to 19.

A. The reasons to change the DEIS construction plan are similar to those previously discussed for the Coyote Spring options and will not be included here. Some differences should be noted though, such as an increased number of DTN crossings over major highways and railroads and the fact that some 850,000 residents live within the deployment area. Though the DTN is shorter for this basing mode than for Nevada/Utah, the additional highway and railroad crossings were assumed to negate any reduction in manpower resulting from this reduction in length.

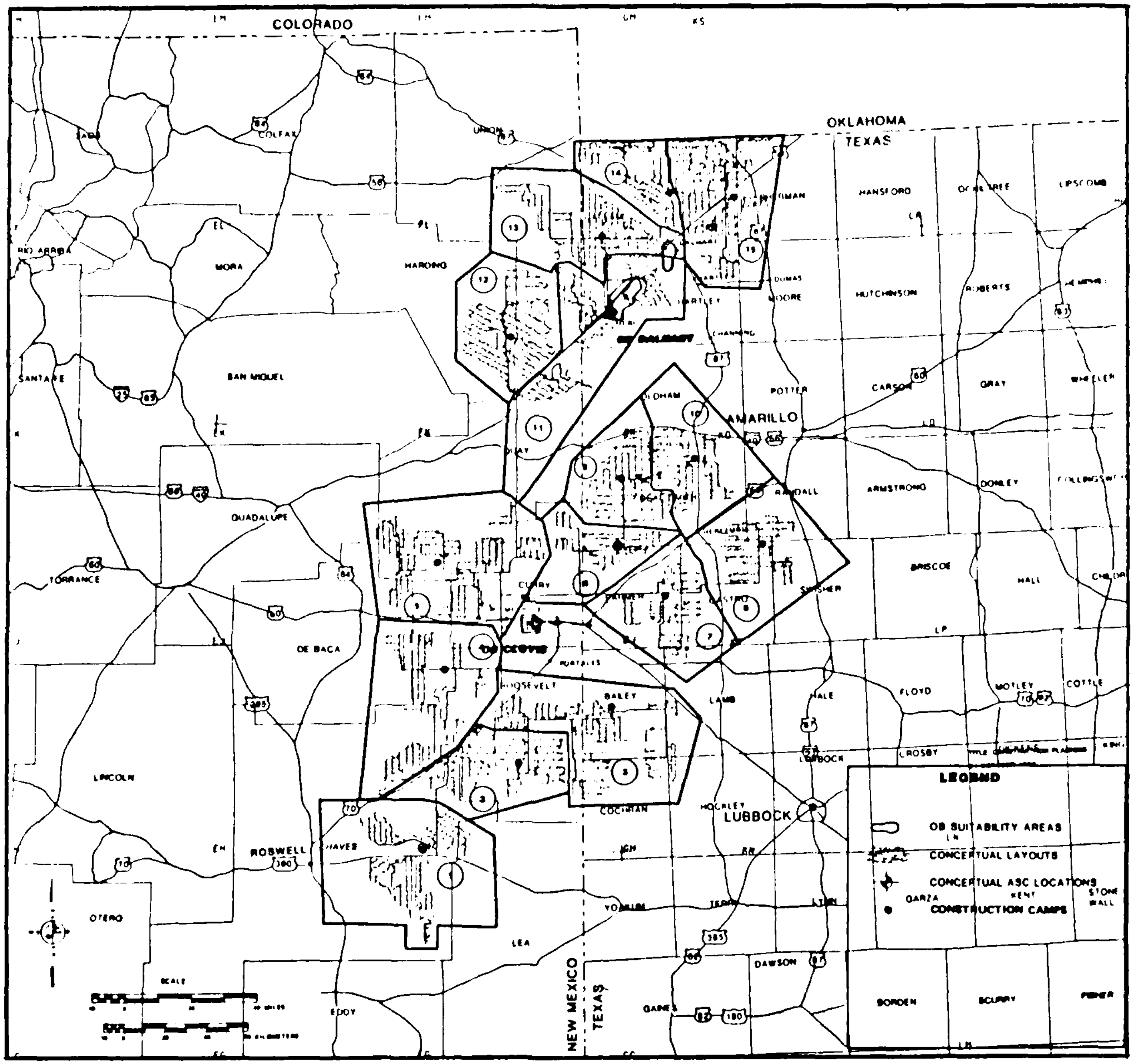
B. Based upon the foregoing and a need to develop a sequential construction area approach, a revised construction plan was devised using the same assumptions as previously listed for the proposed Coyote Spring options and again will not be included here.

C. Using the assumptions referrred to above, a sequence of construction was established to provide for contiguous turnover of completed clusters emanating from the first operating base to the second and then to the boundaries of the deployment area. This sequence of construction was planned using 6 zones under construction concurrently with plant moves as reflected in Table 5-1.

D. As which the other options, similar techniques were used to develop Tables 5-2 through 5-7.

Construction Plant Move Sequence- Clovis Option						
		Sequence Number				Total Clusters Per Plant
		1	2	3	4	
Plant A	Zone	5	1			
	No. of Clusters	19	15			34
Plant B	Zone	4	9	8		
	No. of Clusters	15	13	9		37
Plant C	Zone	3	15			
	No. of Clusters	15	17			32
Plant D	Zone	2	6	10		
	No. of Clusters	14	8	10		32
Plant E	Zone	11	12			
	No. of Clusters	16	17			33
Plant F	Zone	14	13	7		
	No. of Clusters	8	16	8		32

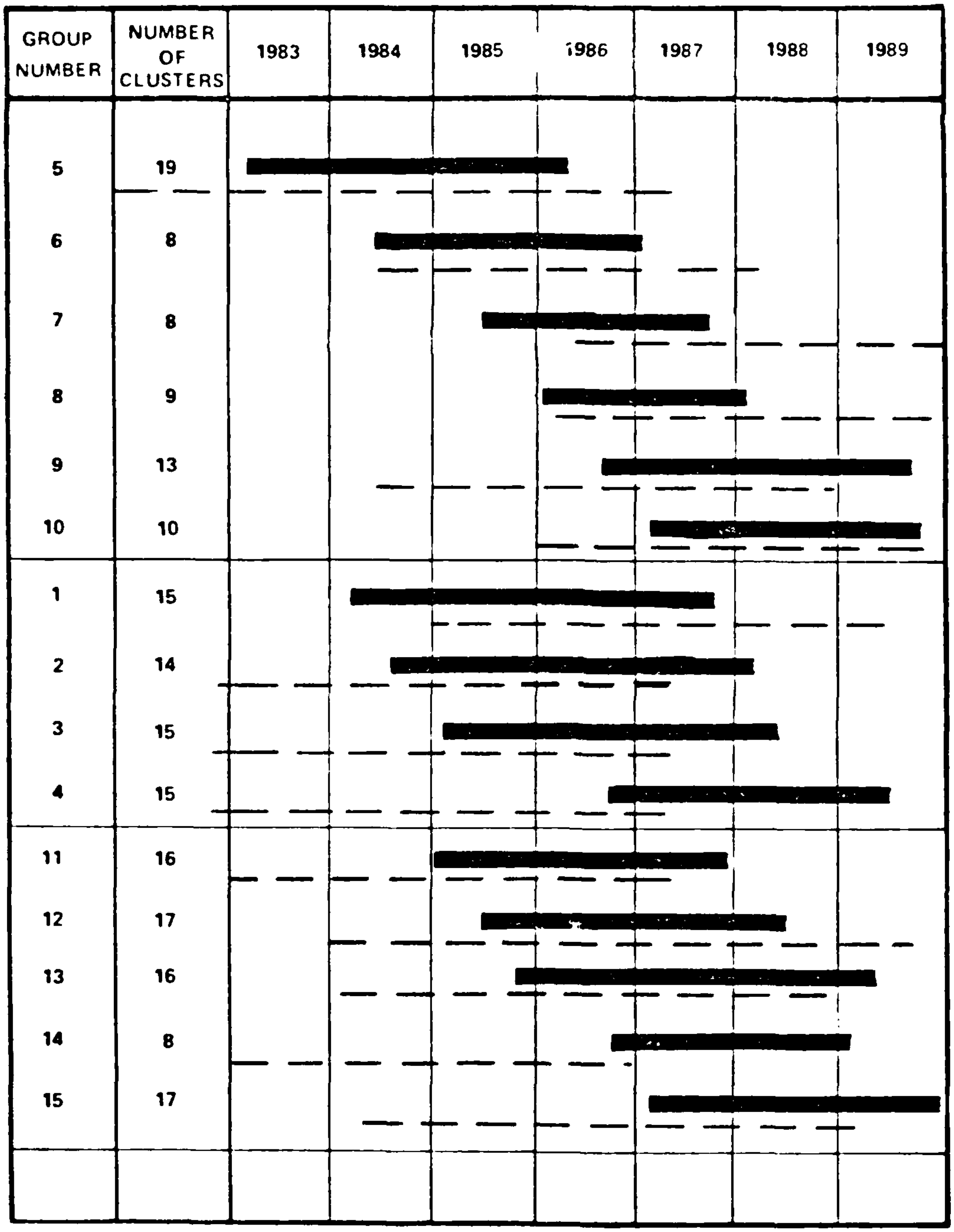
TABLE 5-1



Construction Zones as depicted in the Deployment Area Selection and Land Withdrawal/Acquisition DEIS

FIGURE 5-1

DDA CONSTRUCTION SCHEDULE -- TEXAS/NEW MEXICO OPTION



DEIS Construction Schedule

Task Force Construction Schedule

FIGURE 5-2

Manpower Factors, Clovis Option													
Zone No.	No. of Clus	DTN, Initial Constr.			Camp Construction			Electrical			Cluster Roads		
		No.of Month	Man Months (@110/clu)	No.of MnYr	No.of Month	Man Months (@100/clu)	No.of MnYr	No.of Month	Man Months (@397/clu)	No.of MnYr	No.of Month	Man Months (@384/clu)	No.of MnYr
1	15	12	1650	138	12	1500	125	12	5955	496	12	5760	480
2	14	12	1540	128	12	1400	117	12	5558	463	12	5376	418
3	15	12	1650	138	12	1500	125	12	5955	496	12	5760	480
4	15	12	1650	138	12	1500	125	12	5955	496	12	5760	480
5	19	12	2090	174	12	1900	158	12	7543	629	12	7296	608
6	8	12	880	73	12	800	67	12	3176	265	12	3072	256
7	8	12	880	73	12	800	67	12	3176	265	12	3072	256
8	9	12	990	82	12	900	75	12	3573	298	12	3456	288
9	13	12	1430	119	12	1300	108	12	5161	430	12	4992	416
10	10	12	1100	92	12	1000	83	12	3970	331	12	3840	320
11	16	12	1760	147	12	1600	133	12	6352	529	12	6144	512
12	17	12	1870	156	12	1700	142	12	6749	563	12	6528	544
13	16	12	1760	147	12	1600	133	12	6352	529	12	6144	512
14	8	12	880	73	12	800	67	12	3176	265	12	3072	256
15	17	12	1870	156	12	1700	142	12	6749	562	12	6528	544
Total	200		22000	1834		20000	1667		79400	6617		76800	6100

TABLE 5-2

Manpower Factors, Clovis Option

Zone No.	No. of Clus	Contruction Plant			Cluster Site Work			Road Finish			ASC Construction		
		No. of Month	Man Months (@900+/clu)	No. of MnYr	No. of Month	Man Months (1282+/clu)	No. of MnYr	No. of Month	Man Months (@ 91/clu)	No. of MnYr		Man Months (@1350 ea)	No. of MnYr
1	15	22	13378	1115	24	18876	1573	3	1365	114	--	--	--
2	14	21	12770	1064	23	18090	1507	3	1274	106	--	1350	112
3	15	22	13378	1115	24	18876	1573	3	1365	114	--	--	--
4	15	22	13378	1115	24	18876	1573	3	1365	114	--	--	--
5	19	27	16419	1368	29	22809	1901	3	1729	143	--	--	--
6	8	13	7905	659	15	11798	983	3	728	61	--	1350	113
7	8	13	7905	659	15	11798	983	3	728	61	--	--	--
8	9	14	8514	710	16	12584	1049	3	819	68	--	--	--
9	13	19	11554	963	21	16516	1376	3	1183	99	--	--	--
10	10	16	9730	811	18	14157	1180	3	910	76	--	--	--
11	16	23	13986	1165	25	19662	1639	3	1456	121	--	1350	113
12	17	24	14596	1216	26	20449	1704	3	1547	129	--	--	--
13	16	23	13986	1165	25	19662	1638	3	1456	121	--	--	--
14	8	13	7905	659	15	11798	983	3	728	61	--	--	--
15	17	24	14596	1216	26	20449	1704	3	1547	129	--	--	--
Tota	200		180000	15000		256400	21367		18200	1517		4050	338

TABLE 5-2 continued

Manyear Loading for Clovis Option

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	1	15														138																	114						
Camp Const.																115				10																		
Electrical																100				132				132				132										
Cluster Roads																				480																		
Const. Plant																				51				608				456										
Clust. Site Work																								590				787				196						
ASC																																						
DTN	2	14			32			96															106															
Camp Const.					20			97																														
Electrical									107			143				143				70																		
Cluster Roads												448																										
Const. Plant													152			608				304																		
Clust. Site Work																	590			787				130														
ASC																				112																		
DTN	3	15			35				103														114															
Camp Const.					21				104																													
Electrical									115			153				153				75																		
Cluster Roads												480																										
Const. Plant												152				608				355																		
Clust. Site Work																	590			787				196														
ASC																																						
Total																																						

TABLE 5-3

Manyear Loading for Clovis Option

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	4	15			32				103														114															
Camp Const.					21				104																													
Electrical									115			151				151			70																			
Cluster Roads												480																										
Const. Plant													152			608				355																		
Clust. Site Work																	590			787				196														
ASC																																						
DTN	5	19		174																				143														
Camp Const.				145			13																															
Electrical					70			140				140				140				139																		
Cluster Roads								608																														
Const. Plant													608			608				152																		
Clust. Site Work													394				787			720																		
ASC																																						
DTN	6	8										37					36										61											
Camp Const.												28					39																					
Electrical													24			96				96				49														
Cluster Roads																	128			128																		
Const. Plant																					355			301														
Clust. Site Work																					196			787														
ASC																								113														
Total																																						

TABLE 5-3 continued

Manyear Loading for Clovis Option

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	7	8																		37					36									61				
Camp Const.																				28					39													
Electrical																				24				96				96					49					
Cluster Roads																								128					128									
Const. Plant																													507				152					
Clust. Site Work																												394					589					
ASC																																						
DTN	8	9																			61				21								68					
Camp Const.																					50				25													
Electrical																					50				99				99				50					
Cluster Roads																									216				72									
Const. Plant																													507				203					
Clust. Site Work																													459				590					
ASC																																						
DTN	9	13										60					59											99										
Camp Const.												45					63																					
Electrical												30					123				123				123			31										
Cluster Roads																	208				208																	
Const. Plant																					304				608			51										
Clust. Site Work																					195				787			394										
ASC																																						
Total																																						

TABLE 5-3 continued

Manyear Loading for Clovis Option

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	10	10																			92													76					
Camp Const.																					76			7															
Electrical																					63			102					102					64					
Cluster Roads																								320															
Const. Plant																									51				608					152					
Clust. Site Work																													590					590					
ASC																																							
DTN	11	16							147															121															
Camp Const.									122		11																												
Electrical									113				151				151			114																			
Cluster Roads													512																										
Const. Plant													152				608			405																			
Clust. Site Work																	590			787				262															
ASC																				113																			
DTN	12	17														156																129							
Camp Const.																130				12																			
Electrical																121				160				160				122											
Cluster Roads																				544																			
Const. Plant																				152				608				456											
Clust. Site Work																								590				787				327							
ASC																																							
Total																																							

TABLE 5-3 continued

Manyear Loading for Clovis Option

	Zone	Clusters	1982				1983				1984				1985				1986				1987				1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DTN	13	16											110				37													121								
Camp Const.													90				43																					
Electrical													76				151				151				151													
Cluster Roads																	384				128																	
Const. Plant																					456				608			101										
Clust. Site Work																					394				787			458										
ASC																																						
DTN	14	8						73													61																	
Camp Const.								61			6																											
Electrical								72					86				86		21																			
Cluster Roads													256																									
Const. Plant													51				608																					
Clust. Site Work																	787		196																			
ASC																																						
DTN	15	17										78				78															129							
Camp Const.												59				83																						
Electrical												37				150				150				150				75										
Cluster Roads																	272			272																		
Const. Plant																				405				608			208											
Clust. Site Work																						197		787				720										
ASC																																						
Total																																						

TABLE 5-3 continued

Average A&CO Personnel
Clovis Option

Zone	No. of Cluster	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	15						40	60	1192	
2	14			50	48	1164	364			
3	15			75	48	674				
4	15	10	100	75	998	1801				
5	19			75	48	202	1096			
6	8					3	53	880		
7	8							35	863	
8	9				48			50	840	
9	13					28	53	1061		
10	10							60	875	100
11	16			25	48	41	1273			
12	17					7	53	589	580	
13	16				12	41	545	529		
14	8					10	770			
15	17					29	53	1086		
1st OB/DAA		50	200	500	900	1250	1250	1250	1250	250
2nd OB							50			
Total		60	300	800	2150	5250	5600	5600	5600	350
Amarillo*		250	500	600	300	200	200	200	200	100
Grand Total		310	800	1400	2450	5450	5800	5800	5800	450

* Amarillo will have 30 A&CO Personnel in 1981

TABLE 5-4

Workforce Distribution Clovis Option — Page 1 of 6

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	Construction				353	673	1330	1375	310	
	COE* and Contingency**				82	156	309	319	72	
	Subtotal				435	829	1639	1694	382	
	A&CO				--	--	40	60	1192	
	Total				435	829	1679	1754	1574	
2	Construction	52	300	743	1341	1273	236			
	COE* and Contingency**	12	70	172	311	295	55			
	Subtotal	64	370	915	1652	1568	291			
	A&CO	--	--	50	48	1164	364			
	Total	64	370	965	1700	2732	655			
3	Construction	56	322	785	1351	1217	310			
	COE* and Contingency**	13	75	182	313	283	72			
	Subtotal	69	397	967	1664	1500	382			
	A&CO	--	--	75	48	674	--			
	Total	69	397	1042	1712	2174	382			

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 5-5

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
Workforce Distribution Clovis Option									Page 2 of 6	
4	Construction	56	322	783	1349	1221	310			
	COE* and Contingency**	13	75	182	313	283	72			
	Subtotal	69	397	965	1662	1504	382			
	A&CO	10	100	75	998	1801	--			
	Total	79	497	1040	2660	3305	382			
5	Construction	389	761	1142	1535	1011	143			
	COE* and Contingency**	90	177	265	356	235	33			
	Subtotal	479	938	1407	1891	1246	176			
	A&CO	--	--	75	48	202	1096			
	Total	479	938	1482	1939	1448	1272			
6	Construction			89	299	775	1253	61		
	COE* and Contingency**			21	69	180	291	14		
	Subtotal			110	368	955	1544	75		
	A&CO			--	--	3	53	880		
	Total			110	368	958	1597	955		

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 5-5 continued

Workforce Distribution Clovis Option										Page 3 of 6
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
7	Construction					89	299	1125	851	
	COE* and Contingency**					21	69	261	197	
	Subtotal					110	368	1386	1048	
	A&CO					--	--	35	863	
	Total					110	368	1421	1911	
8	Construction					161	361	1137	911	
	COE* and Contingency**					37	84	264	211	
	Subtotal					198	445	1401	1122	
	A&CO				48	--	--	50	840	
	Total				48	198	445	1451	1962	
9	Construction			135	453	830	1518	575		
	COE* and Contingency**			31	105	193	352	134		
	Subtotal			166	558	1023	1870	709		
	A&CO			--	--	28	53	1061		
	Total			166	558	1051	1923	1770		

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 5-5 continued

Workforce Distribution Clovis Option										Page 4 of 6
Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
10	Construction					231	480	1300	882	
	COE* and Contingency**					54	111	302	204	
	Subtotal					285	591	1602	1086	
	A&CO					--	--	60	875	100
	Total					285	591	1662	1961	100
[illegible]	Construction		382	826	1349	1419	383			
	COE* and Contingency**		89	192	313	329	88			
	Subtotal		471	1018	1662	1748	471			
	A&CO		--	25	48	41	1273			
	Total		471	1043	1710	1789	1744			
12	Construction				407	868	1358	1365	456	
	COE* and Contingency**				94	202	315	317	105	
	Subtotal				501	1070	1673	1682	561	
	A&CO				--	7	53	589	580	
	Total				501	1077	1726	2271	1141	

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 5-5 continued

Workforce Distribution Clovis Option

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
13	Construction			276	615	1129	1546	680		
	COE* and Contingency**			64	142	162	359	158		
	Subtotal			340	757	1391	1905	838		
	A&CO			--	12	41	545	529		
	Total			340	769	1432	2450	1367		
14	Construction		206	399	1481	278				
	COE* and Contingency**		47	93	343	65				
	Subtotal		253	492	1824	343				
	A&CO		--	--	--	10	770			
	Total		253	492	1824	353	770			
15	Construction			174	583	1024	1545	998	129	
	COE* and Contingency**			40	135	238	359	231	30	
	Subtotal			214	718	1262	1904	1229	159	
	A&CO			--	--	29	53	1086	--	
	Total			214	718	1291	1957	2315	159	

* COE value obtained by multiplying Construction Worker estimates by .10
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 5-5 continued

Zone	Type of Worker	1982	1983	1984	1985	1986	1987	1988	1989	1990
Workforce Distribution Clovis Option									Page 6 of 6	
	DDA Grand Total Construction	553	2293	5352	11116	12199	11072	8616	3539	
	COE* and Contingency**	128	533	1242	2576	2833	2569	2000	819	
	Subtotal	681	2826	6594	13692	15032	13641	10616	4358	
	A&CO	10	100	300	1250	4000	4300	4350	4350	100
	Total	691	2926	6894	14942	19032	17941	14966	8708	100
	Construction									
	COE* and Contingency**									
	Subtotal									
	A&CO									
	Total									
	Construction									
	COE* and Contingency**									
	Subtotal									
	A&CO									
	Total									

* COE value obtained by multiplying Construction Worker estimates by .10 .
** Contingency values obtained by multiplying the sum of COE and Construction Worker values by .12

TABLE 5-5 continued

OPERATIONAL WORK FORCE CLOVIS OPTION	1982	1983	1984	1985	1986	1987	1988	1989	1990*
OPERATING BASE 1									
OFFICERS		10	34	224	487	610	610	610	
ENLISTED		27	148	1907	4342	5900	5900	5900	
CIVILIANS		2	52	480	848	1212	1212	1220	
TOTAL		39	234	2611	5677	7722	7722	7730	
OPERATING BASE 2									
OFFICERS				5	12	166	262	290	
ENLISTED				24	170	1513	3416	4275	
CIVILIANS				2	64	267	819	1035	
TOTAL				31	246	1946	4497	5600	
TOTAL WORK FORCE		39	234	2642	5923	9668	12219	13330	

* Population in 1990 and subsequent years are the same as 1989

TABLE 5-6

MANPOWER SUMMARY CLOVIS OPTION

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
DDA											
Construction--COE-Contingency		681	2826	6594	13692	15032	13641	10616	4358		
A&CO		10	100	300	1250	4000	4300	4350	4350	100	
Total		691	2926	6894	14942	19032	17941	14966	8708	100	
OBTS/DAA/OB-1											
Construction--COE-Contingency		1392	2755	2762	2618	1565	1052				
A&CO		50	200	500	900	1250	1250	1250	1250	250	
Operations			39	234	2611	5677	7722	7722	7730	7730	7730
Total		1442	2994	3496	6129	8492	10024	8972	8980	7980	7730
OB-2											
Construction--COE--Contingency				179	1877	2156	1899	718			
A&CO							50				
Operations					31	246	1946	4497	5600	5600	5600
Total				179	1908	2402	3895	5215	5600	5600	5600
TOTALS											
Construction--COE-Contingency		2073	5581	9535	18187	18753	16592	11334	4358		
A&CO		60	300	800	2150	5250	5600	5600	5600	350	
Operation			39	234	2642	5923	9668	12219	13330	13330	13330
Total		2133	5920	10569	22979	29926	31860	29153	23288	13680	13330
OFFSITE											
A&CO Amarillo	30	250	500	600	300	200	200	200	200	100	
COE Clovis	77	208	347	410	410	410	410	300	100	100	
Total offsite	107	458	847	1010	710	610	610	500	300	200	
GRAND TOTAL	107	2591	6767	11579	23689	30536	32470	29653	23588	13880	13330

TABLE 5-7

END

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